MEDICAL LIBRARY

BRITISH MEDICAL JOURNAL

JOURNAL OF THE BRITISH MEDICAL ASSOCIATION

SATURDAY JUNE 16 1951

UNIVERSITY OF MICHIGAN
JUL 2 1951
MEDICAL LIBRARY

TABLE OF CONTENTS

Aspects of the Circulation's Economy.—I K. J. FRANKLIN, D.M., F.R.C.P. 1343

Low-salt Diet for Congestive Heart Failure
A. LEVIN NIELSEN, M.D., P. BECHGAARD, M.D., and H. O. BANG, M.D. 1349

Radiation, Light, and Illumination J. N. ALDINGTON, Ph.D., F.R.I.C. 1353

Haemolytic Disease of Newborn Due to Immune Anti-A Agglutinin
A. ZOUTENDYK, M.R.C.S., and A. BROIDO, M.R.C.O.G. 1357

Changes in Sweating after Prickly Heat W. S. S. LADELL, M.B. 1358

Actinomycosis in the North-east of Scotland I. A. PORTER, M.B. 1360

Potassium Bromate Poisoning WILLIAM A. PARKER, M.D., and JOHNSTON R. BARR, M.B. 1363

Pregnancy Prolonged Beyond the Expected Date DOUGLAS LATTO, M.B., M.R.C.O.G. 1364

MEDICAL MEMORANDA

Fatal Case of Acute Ulcerative Colitis with Multiple Perforations. LOUIS L. GRIFFITHS, M.D., D.P.H., and LEO GILCHRIST, M.D., M.R.C.P. 1366

A Case of Q Fever. H. CAMERON, M.R.C.S., L.R.C.P. 1367

REFRESHER COURSE

Treatment of Common Acute Infections of the Fingers and Hand. R. S. PILCHER, M.S., F.R.C.S. 1378

GENERAL ARTICLES AND NEWS

A List of Medical Museums of Great Britain (1949–50). C. J. HACKETT, M.D. 1380

Medical Birthday Honours 1383

REPORTS OF SOCIETIES 1384

BEIT MEMORIAL FELLOWSHIPS FOR MEDICAL RESEARCH 1389

A Portable Hot-cot for Transporting Premature Infants. MARGARET B. MARTIN, F.R.C.P.Ed., and ELUNED STEVEN, M.B., B.S., D.C.H., D.Obst.R.C.O.G. 1390

MEDICAL NOTES IN PARLIAMENT 1397

UNIVERSITIES AND COLLEGES 1398

MEDICAL NEWS 1402

BIRTHS, MARRIAGES, AND DEATHS 1403

QUERIES AND COMMENTS 1403

Vital Statistics 1399

LEADING ARTICLES

The Annual Meeting 1371

Arbitration on G.P. Remuneration 1372

The Foundation of Mental Health 1373

ANNOTATIONS

Population Policy 1374

The Medresco Hearing-aid 1375

Post-maturity 1376

Salaries of Hospital Board Officers 1376

Training Hospital Administrators 1377

Closed Shop at Durham 1377

Festival Lecture 1377

OBITUARY

Sir Thomas Watts, M.D. 1395

M. P. Reddington, M.B., F.R.C.S., M.R.C.O.G. 1395

Harold Upcott, F.R.C.S. 1396

W. F. McLean, M.D. 1396

Alexander Cruickshank, M.B. 1396

Walter Asten, M.D. 1397

E. Harvey, B.M. 1397

I. F. McAsh, L.R.C.P.Ed., H.D.D. 1397

MEDICO-LEGAL

Chemists' Shop not a "Factory" 1398

SUPPLEMENT

For Contents see First Page of Supplement

CORRESPONDENCE

A.C.T.H., Cortisone, and Abdominal Catastrophes. HAROLD EDWARDS, F.R.C.S. 1390

Syphilis in Different Races. JAMES MARSHALL, M.D. 1391

Epidemic Vertigo. S. C. ROGERS, M.B. 1391

Eosinophils and Blood Clotting. E. KELEMEN, M.D., and others 1391

Conception and Oligozoospermia. P. M. F. BISHOP, D.M. 1392

Early Diagnosis of Infective Hepatitis. GORDON SCOTT, M.B. 1392

Morphine and Pancreatic Secretion. H. WAPSHAW, M.D. 1392

Treatment of Perforated Ulcer. P. HICKINBOTHAM, F.R.C.S. 1393

The Acute Mental Case. ROBERT THOMPSON, M.B. 1393

Clinical Significance of Vitamin A. W. N. LEAK, M.D. 1393

Bitten by Adder. DERYCK L. H. GODDARD, M.D. 1394

Points from Letters 1394

REVIEWS

Anatomical Atlases 1368

The Shoulder Girdle 1369

Exotic Diseases 1369

A Successful Congress 1370

Books Received 1370

BRITISH MEDICAL ASSOCIATION, TAVISTOCK SQUARE, LONDON, W.C.1

No. 4719, WEEKLY, PRICE 2/-

Copyright

REGISTERED AS A NEWSPAPER

From single-cell selection
to large-scale production

D.C.L.
VITAMIN B YEAST

is subjected to the strictest biological and chemical control. The special yeast contains approximately:

Vitamin B_1	300 International Units per gram (900 micrograms)
Riboflavin	50 micrograms per gram.
Nicotinic Acid	250-350 micrograms per gram.
Vitamin B_6 (Pyridoxin)	25-50 micrograms per gram.

(3 D.C.L. Tablets equal 1 gram)

Members of the Medical Profession are invited to write for full particulars and a trial supply.

THE DISTILLERS COMPANY LTD., EDINBURGH

Like mother . . . like daughter

. . . And they both like Groats. In pregnancy and nursing, Robinson's 'Patent' Groats can be confidently recommended. Later it makes an excellent weaning food and may be alternated with other cereals to give variety. Groats is made from oats, the most nourishing of all cereals, which is rich in fat, protein and vitamin B_1 and high in caloric value.

Leaflet "Cereals in Infant Feeding" will be sent on request. Keen, Robinson, Dept. M H Carrow, Norwich.

Robinson's 'patent' Groats

SPECIALLY FORTIFIED — ONE MINUTE TO COOK

CVB-106

To all who are interested in Iodine—its effects, its uses, its possibilities — the Chilean Iodine Educational Bureau offers information and advice. Reviews of selected aspects of Iodine usage are available, including:

DETERMINATION OF IODINE IN FOODSTUFFS
TREATMENT OF INFLUENZA AND THE COMMON COLD
WORLD GOITRE SURVEY
IODINE AND THE PLANT LIFE

Every endeavour will be made to meet your requests for information. There is no charge

Chilean Iodine Educational Bureau

19, STONE HOUSE, BISHOPSGATE, LONDON, E.C.2

Important to Doctors ordering Surgical Stockings

To obtain the best results for patient it is not sufficient to order "Elastic Stockings". You will secure for the recognised additional benefits of two-way stretch hose if you write in full "LASTEX TWO-WAY STRETCH" on your prescriptions.

ACADEMIC REGD

LASTEX TWO-WAY STRETCH ELASTIC HOSE
Circular Pressure Controllable
HYGIENIC * COMFORTABLE * INCONSPICUOUS * WASH
Standard Sizes and to Individual Requirements
ACADEMIC DEPOT, 158 Oxford Street, London, W.
SPECIALISTS FOR A QUARTER OF A CENTURY

BRITISH MEDICAL JOURNAL

LONDON SATURDAY JUNE 16 1951

ASPECTS OF THE CIRCULATION'S ECONOMY*

BY

K. J. FRANKLIN, D.M., D.Sc., F.R.C.P.

Professor of Physiology, St. Bartholomew's Hospital Medical College

Dr. Oliver's objects in founding these lectures in memory of Professor William Sharpey were "to promote physiological research by observation and experiment, and encourage the application of physiological knowledge to the prevention and cure of disease and the prolongation of life." With these objects I find myself to be in sympathy; they are, indeed, very much the basis of my own outlook, as they were of that of one of my heroes, Richard Lower (1631–91), Harvey's greatest follower in circulation studies in the seventeenth century. I would particularly stress physiological research *by observation*, much as I value and have indulged in its counterpart; for experiments too often disturb unduly the normal conditions and render difficult the assessment, from their results, of what *naturally* happens. Direct acquisition of knowledge by observation has been a feature of our science throughout the two millennia of its story, and it has become possible in recent times, as I shall describe more fully later, to extend such "zooscopy" (Franklin, 1933, 1949b) to many of the internal activities, including the blood's circulation, of the living body.

My choice of subject for these lectures would, I think, have appealed to both Sharpey and Oliver, for the latter's interest in the blood and its circulation is manifest in the titles of his book (Oliver, 1895) and of the papers which he published in the *Journal of Physiology* (Anon., 1928), while the former's main research contribution was on ciliary action, and the movement of mucus by cilia is part of the circulation in the extended connotation of that term which I shall mention below.†

Literature

The blood's circulation and the cardiovascular system within which it is effected have been my major research interests for nearly 30 years, and I have deemed it right to study the associated literature with some thoroughness, whatever the date of publication of any particular contribution may have been. This is not any purposeless devotion to medical history as such, but an attempt to "take out of the past all that is noble and good, and to build on it for the future"; it is also an acknowledgment that the great men of earlier centuries can still, through their thoughts and attitude to our science, assist our progress to-day. In one instance in particular—namely, in connexion with our Oxford work on the foetal circulation and cardiovascular system (see Barclay *et al.*, 1944)—study of the literature produced not only the right outlook on certain vexed points, but also a list of queries and agenda which formed the basis of our next season's research. It also, in part, suggested my subsequent anatomico-physiological research upon the Eustachian valve (Franklin, 1948b).

Apart from the above particular indebtedness to historical studies, I should like to mention that they give one a correct perspective and thereby proper orientation. In the nineteenth century the main interest of the cardiovascular physiologist was in the heart and arteries; thereafter the small and the most minute vessels came more into the picture with the work of Ebbecke (1917), Dale *et al.*, Krogh,* and Lewis, the veins with the later work of Fleisch and Gollwitzer-Meier,† and arteriovenous anastomoses with that of Lewis and Grant and others. Experimental proof of the functional activity of blood depots, and of the consequent changes in circulating blood volume, dates essentially from Joseph Barcroft's work of 1922 and thereabouts.

More important, however, than this ever-expanding scope of blood-circulatory physiology is the realization that the blood circulation itself is but part of the vast continuous movement of the body fluids as a whole, a movement by means of which even the cell constituents are constantly being removed and replaced so that no individual remains exactly the same being from hour to hour, or even from minute to minute, however much he appears so to do to himself and to his fellows. I have recently (Franklin, 1951) written on this extended connotation of the circulation which we owe primarily to isotope researches carried out by the biochemists, so I will not say much more about it here. It has, however, corrected a progressive lack of balance between

*The first Oliver–Sharpey Lecture, given at the Royal College of Physicians of London on March 13, 1951.

†Carl Ludwig introduced the kymographic recording of blood pressure in 1847, and Sharpey used to show students and others how it was done by turning his top-hat round and imitating the movement of the float with a finger. The hat used to be preserved at University College, but I have not seen it since the recent war. My own copy of Harvey's *Opera omnia* (1766) has the inscription, "University College London. 1st May, 1840. To Mr. I. B. Carlill, in remembrance of the Session 1839–40. From W. Sharpey, M.D. Professor of Anatomy and Physiology." Sharpey (see Sharpey-Schafer, 1927, 17) studied classics at Edinburgh University before transferring to the Faculty of Medicine, and it is interesting that, from the Latin medical texts available in 1840, he chose Harvey's works for the presentation to his pupil, Mr. Carlill.

*Krogh's work on the capillaries is so neatly appraised by the words, *Ad augusta per angusta*, that I have no compunction in "lifting" the phrase from its original setting and context in Victor Hugo's *Hernani*.

†Sir James Barr in 1930 claimed some measure of priority in this new outlook. He wrote: "The objects of the circulation are to convey oxygen and nutritive material to the tissues, and remove carbonic acid and other waste products therefrom. I look upon the circulatory system as one unit, but although we have numerous books on diseases of the heart, it is only of recent years that much attention has been paid to the distributing tubes. When in 1906 I gave the address at the meeting of the British Medical Association in Toronto on the circulation viewed from the periphery it was generally considered that I had opened up a new vista. On many occasions I have dealt with the parts played by the arteries, arterioles, capillaries, and veins."

increasing knowledge of the activities of the blood-circulatory system and less rapidly increasing knowledge of the other fluid movements, and has led to a more integrated view of the whole.

Circulation of the Blood

Having stated that, and having duly stressed its outstanding importance for the proper appreciation of the functioning of the body in both health and disease, I may, perhaps, be allowed to confine my further remarks to aspects of the economy of one particular part of the whole fluid movements—namely, the circulation of the blood. The scope of such circulatory physiology (Franklin, 1948a) can be divided into four parts, concerned respectively with: (1) the blood flow in the embryo and foetus, and the changes which occur at birth; (2) the post-natal blood flow; (3) the blood flow, artificially transferred from one subject to another; and (4) the blood flow in tumours.

With item 3 above I shall not specifically deal. With respect to item 4, I had hoped, a few years ago, that it would be possible to study the circulation in tumours and to discover means by which it could be influenced so as to produce regression of the tumours without any serious disadvantage to the hosts. Dr. R. W. E. Watts and I subsequently discussed the literature and the problem with Professor A. Haddow and Dr. Eric Horning, of the Chester-Beatty Institute, and Dr. Watts made a very determined effort, with the use of two or three techniques, to get the answers. Unfortunately, the techniques proved inadequate and the problem remains. But I hope that some time, with fresh methods, this potentially important research may be resumed, and that it will "encourage the application of physiological knowledge to the prevention and cure of disease and the prolongation of life."

Studies of the circulation of the blood have as their primary objective the acquisition of knowledge about the intact and unanaesthetized human being and lower animals at various stages of their lives, under all conditions from rest to full bodily activity, and over a wide range of variations in external environment. The knowledge required is as follows: (1) How, in what amount, at what speed, and at what pressure the blood is distributed to the various parts. (2) The various details relating to its passage through the tissues or to its by-passing of them. (3) Data about its return from the periphery (tissues, by-passes, and blood depots where such are present) and the reaction of the heart to such return.

As subsidiary objectives of medical and veterinary importance, we may add the above, as affected by: (1) disordered conditions of the body, (2) narcotics and/or anaesthetics, (3) the administration of other substances by various routes, (4) haemorrhage at varying rates and of various total amount, and (5) the transfusion of blood or of blood components.

The objectives in question, it must be admitted, have to date been only very imperfectly attained. On the other hand, study of the circulation was somewhat sporadic until little over a century ago, so the total research period has been relatively short; in addition, it is only during the last three decades or so that the number of those engaged in such research, the range of techniques, and the necessary financial support have increased to an extent at all commensurate with the vastness of the problems to be solved.

Another criticism which can justly be levelled at our present knowledge of the blood circulation is that it is, on the whole, too piecemeal—that is, that there are too few records of the conditions *simultaneously obtaining* in a large number of parts of the functioning cardiovascular system; the great majority of researches have dealt with isolated sections such as the coronary, pulmonary, and cerebral blood flows. It is true that Rein (1931), by applying thermostromuhrs to many blood vessels within each of a number of animals, made a step in the right direction; it is true also that Silfverskiöld (1938) made important contributions to knowledge of the blood volume and its distribution in a variety of conditions, and that certain other studies have given relatively extensive pictures of the circulation. Their total number, however, is as yet all too small, and additions to them are an urgent need.

Radiography and Cineradiography

This particular aspect of research is one which has especially appealed to me over a number of years. About 1931, when I was seeking for a method which would allow study of circulatory happenings without too extensive departures from the normal, produced by operative procedures, I noted in a reprint given me by my friend, Dr. H. M. Carleton, that the thoracic posterior vena cava of the cat was visible in radiographs (Carleton, 1929). That was before the effective introduction of radiopaque media, such as thorotrast, for intravascular injection, and for a while I made progress rather laboriously by a combination of radiography and anatomical dissection. By 1933, however, the contrast media were coming into use, and in that year I co-operated for the first time, indirectly, with Professor Robert Janker, of Bonn, who was the effective pioneer in cineradiographic studies of animal physiology and pathology. In January, 1934, I went to work with him, and few scientific experiences have been so exciting for me as my first view, upon the dazzlingly bright fluorescent screen of his apparatus, of the passage of the radiopaque medium* from the point of its injection round through the blood vessels and the heart.

That was the first of many visits to Bonn, but in some ways it was the most important, for it led to the establishment within the West Wing of the Nuffield Institute for Medical Research, Oxford, of a centre in which, it was planned, all available radiographic and photographic techniques should be applied to medical research. I still have my original list* of the techniques I envisaged we might use; many have been employed in the Institute since its opening in 1935, even if one at least waited for a decade. Another has not been used in the Institute, but has recently been a success in the hands of Dr. D. A. McDonald and Dr. J. M. Potter in my department at Bart's.† Still others remain as yet unused, though potentially informative.

The point which I wish to make here is that cineradiography in its direct and indirect forms, and radiography as indicated, combined with intravascular or intracardiac injection of suitable contrast media, are for many circulation researches the techniques of choice, for they allow observation or recording with the minimum of

*It owed much to the help of Mr. P. Betton Done and Mr. W. Buckstone, of Messrs. Kodak Ltd., and of my technician, Mr. M. S. Tuckey.

†The use of the technique in question—namely, ultra-high-speed cinematography—was their own idea for recording features of the blood flow in the rabbit's basilar artery. At the Institute I had thought of using the method on studies of the origin of the mammalian heart-beat.

departure, through operative procedures, from the normal.*

From 1936, when the leading British research radiologist, the late Dr. A. E. Barclay, came to the Institute in an honorary capacity, we had the use of all the cineradiographic and radiographic techniques to which I have referred† and circulatory studies, *inter alia*, profited, the first major one being that on the foetal circulation and the changes which occur during, and shortly after, birth (Barclay *et al.*, 1944). Its origin was to some extent fortuitous. I had been to Bonn on yet another visit, and had brought back with me a section of film, made in co-operation with Professor Janker, showing the passage of radiopaque blood through the dog's heart. I offered to project this as an extra demonstration at a meeting of the Physiological Society, and it there followed an ordinary film, made by Sir Joseph Barcroft and Dr. D. H. Barron, of the intrauterine foetal movements. At the time these Cambridge workers were trying to establish the moment of occlusion of the ductus arteriosus, and the accidental juxtaposition of our films in the Society's programme suggested to Dr. Barron that cineradiography might solve their problem. In the outcome the research not only did that, but also gave the larger story of which the functional closure of the by-pass in question forms but a part.‡

The next major circulatory research, which resulted in our *Studies of the Renal Circulation* (Trueta *et al.*, 1947), had as its curtain-raiser the preliminary studies of Barnes and Trueta, carried out in 1941 in relation to war injuries, but not then completed because of the suddenly increased wartime demands made upon surgeons' time. The later research was discussed by Drs. Trueta and Barclay and myself one Sunday night in Oriel Senior Common Room, and was planned to be a comprehensive study of direct, central, and reflex nervous effects upon all radiographically accessible parts of the functioning cardiovascular system (Trueta, 1945). Before it became diverted to the renal circulation in particular, it yielded information about the events occurring simultaneously within the greater part of the rabbit's circulatory system—that is, it gave the sort of wider picture to which I have above referred. Some of its renal results are mentioned later. Meanwhile, I would add that, as before, the radiographic studies were reinforced by related anatomical, though this time microscopical rather than macroscopical, ones.

After leaving Oxford in 1947 for Bart's, I was without the techniques which I had enjoyed at the Nuffield Institute, but I still wished to study the circulation as a whole as well as piecemeal. It seemed to me that I might possibly accomplish the former, though gaining only one picture per animal used, if I could inject intravenously a dye which did not diffuse at all rapidly from the blood, could therefore inject a coagulant which would not seriously alter the blood distribution, and, finally, could fix the specimen and prevent further change. With 5% Evans blue in the dosage of 1.5 ml. per kg. as the dye, "stypven" (Russell viper venom) in the dosage of 1 mg. per kg. as the coagulant, and 5 or 10%* formol as the fixative, this has proved a useful technique for a number of purposes, especially to corroborate or expand results obtained by other means, but it is not yet perfect; in particular, the dye tends to diffuse *post mortem*.† Fast thrombin, another coagulant which I have used, is less satisfactory because it can provoke vascular reflexes.

*It is rather like what happened in a dream experienced by Professor U. Ebbecke, of the Physiological Institute, Bonn. In a field he saw a girl with an animal which was transparent; the blood vessels were all visible and he could see the blood go "whoof" round the various organs. He thought he would like to have such an animal (it was a sort of marmot) for himself, so he asked the girl where she had got it (as she said her father would not let her part with that one), and ordered one for himself. But, when his animal came, it was of the common variety, and his disappointment was not ordinary.

†He brought the direct apparatus invented by himself, and while at the Institute devised and made an indirect one.

‡History and comparative anatomy made not inconsiderable contributions to the research, and we were greatly indebted to Dr. (now Professor) E. C. Amoroso for his great and disinterested help in respect of the structural studies.

Differential Distribution of Available Blood Volume

After that long but necessary introduction I pass to a major theme—namely, the differential distribution of the available blood volume under a variety of circumstances, and the mechanisms by which such differential distribution is effected. Gollwitzer-Meier (1931) wrote that the regulation of the blood flow serves to adapt the blood supply of the organs to their needs; similarly, Fleisch (1935) wrote that its object is to ensure that each tissue has brought to it in each moment of time the exact amount of blood necessary for its activity. With certain qualifications‡ this view is acceptable for physiological conditions, but in a number of pathological ones parts of the body may have their blood supplies severely reduced while others continue to receive more or less their normal allowance.

Before, however, proceeding farther along this line, I have to note that the differential distribution of the available blood volume has been envisaged in two senses. In one of these it is the anatomical allocation of the blood volumes between the heart and the various vascular territories, in the other it is the physiological apportioning of the total cardiac output as *blood flows* to the different tissues. The anatomical picture is to some extent linked up with the physiological one, but a particular vascular area can obviously be fairly full of blood without the flow through it being marked, and vice versa. Unfortunately, measurement of flow is technically difficult, and objection can be taken to many of the procedures as introducing unphysiological conditions. Indeed, despite certain drawbacks, the answers given by timing the cineradiographically recorded progress of contrast media, and multiplying the distances travelled by the cross-sections of the vessels determined (on the assumption that they are circular) from their calibres, are often preferable to the answers given by thermostromuhrs and other measuring devices.

Blood Depots

Be that as it may, we can begin by examining what I have called the anatomical blood distribution; and first I would mention the content of blood found or estimated to be in the blood depots (see Franklin, 1937). In the dog the only unconditional one—namely, the spleen—can contain the equivalent of up to 20% of the total blood volume, but in other laboratory species the percentage is lower, and in some very small indeed. In the dog, Grab, Janssen, and Rein (1929) considered that the liver's contribution (released through the activity of the hepatic venous sluices) could exceed

*5% for macroscopical, 10% for microscopical, purposes.

†In the earlier researches I had the co-operation of my friend Professor E. C. Amoroso, and I should like here to acknowledge his help. I was also indebted to various members of my departmental staff for investigations of particular points, and am likewise grateful to them.

‡I am thinking here mainly of the capacities of some tissues for accumulating a temporary oxygen debt.

that of the spleen, but Silfverskiöld (1938) found this idea unacceptable; he was also unable to accept earlier estimates of the capacity of the splanchnic area. Barcroft gave the maximum content of all the depots in the dog, were they simultaneously full, as 46% of the total blood volume, but this was the result of an addition sum rather than a direct experimental determination of their combined simultaneous storage capacity.

With regard to man, the depots which have been mentioned have been chiefly the spleen, the subpapillary venous plexus of the skin, and the hepatic venous portion of the liver vasculature. Belief in this last as a possible blood depot is based solely upon anatomical evidence of "sluice mechanisms," similar to the dog's but much more rudimentary, at the exits from the hepatic veins into the vena cava. The subpapillary venous plexus over the whole extent of the skin would not, in Barcroft's view, contain more than 0.5 litre of blood. The spleen, according to the same authority (personal communication), could discharge up to 0.5 litre of concentrated corpuscles,* that is, double what Eppinger and Hueck estimated. Finally, Barcroft regarded 1,800 ml. (Wollheim's estimate of the skin depot's capacity alone) as being a maximum for the capacity of all the human depots together.

Since those statements were made, other evidence has been advanced suggesting that in man there are *no* appreciable reserves of blood or blood cells subject to emergency mobilization. Parson *et al.* (1948), who quoted four references in support of the changed outlook, themselves found no significant change in the plasma or red-cell volumes, as directly measured by the T-1824 or ^{32}P techniques, after subcutaneous injection of 1 mg. of adrenaline. I imagine their conclusions affect only one's belief in the human spleen as a potential blood donor of consequence; and even in respect of that organ one would like to see them repeat, with their more modern techniques, the temperature-change experiments described by Barcroft in 1925.

With regard to mammals other than man, the account given above is derived from separate studies of individual depot functionings, and against it we have to set the findings of Silfverskiöld (1938), who studied the anatomical blood distribution *as a whole*, his main subject being the mouse, his subsidiary ones the guinea-pig and rabbit. He regarded the mouse body as consisting of a cranial portion and a caudal portion, with the diaphragm separating them. The cranial portion was subdivided into head and fore-part, the caudal portion into a middle part and a hind-part. As will be observed from his table, the head was found to contain about 10% of the blood volume at rest and during excitement, and 12% during muscular work. During excitement there was a transfer of 14% from the abdomen; this amount went mainly to the fore-part, but also to some extent to the hind-part, of the animal. Under the action of adrenaline the addition to the lungs was 3% and to the fore-part as a whole 11%; in consequence, more blood was in the portion cranial to the diaphragm than in the rest of the body together. Silfverskiöld's findings as a whole showed that the heart and its associated great vessels have the power to accommodate greatly increased amounts of blood under various conditions, while, on the other hand, being the parts

*The evidence was provided during the radiological screening of a patient in, if my memory serves, Cairo. At one point something went wrong, there was a sudden noise and/or flash behind him, and his spleen promptly contracted to an extent which was estimated at 0.5 litre. One would like further details, but the opportunity is, unfortunately, past for acquiring such.

Silfverskiöld's Survey of Relative Distribution of the Blood Pigment Per Cent.

	Rest	Excitement	Work	Narcosis and Laparotomy	Ether Collapse	Adrenaline	Peritonitis
Head ..	10	10	12	14	8	—	13
Fore-part of body ..	35	44	—	36	37	46	24
—Lungs ..	—	—	—	6	4	9	—
Middle part of body ..	43	29	—	36	45	—	19
—Liver ..	—	—	—	14	25	—	—
—Intestine ..	—	—	—	5	3	—	—
Hind-part of body ..	13	17	18	16	10	—	15

mainly responsible for constrictive adaptations to haemorrhage. They also showed that the previously reported great variations in content of the intestinal vessels are largely mythical. With respect to the muscles, it was found that during activity the increase of blood in the two hind-parts, though these included half the musculature of the body, represented only 5% of the total. In the rabbit, despite the relative increase in the dimensions of the abdominal part of the alimentary canal, the blood content of the intestinal vessels was still not more than 9–10% of the total, with this latter reckoned as 6% of the animal's body weight. The findings as a whole are most interesting, though it would be useful if corresponding studies were available for carnivores.

Cardiovascular Blood Distribution

Changes in the anatomical blood distribution within the various parts of the cardiovascular system, including intravisceral changes, are due in the main to nervously and/or humorally intermediated cardiomotor and vasomotor effects. Among the more marked intravascular changes are those in the veins, which are not the passive, lifeless vessels they were commonly stated to be half a century ago, but in many instances extremely reactive tubes, often much more so than the corresponding arteries.

The intravisceral changes in anatomical blood distribution, where not caused by back pressure in the veins draining the organs, are due not only to contraction or dilatation of the supplying arteries before these have entered the organs, but also, in many cases, to altered apportioning of the blood flow within the viscera themselves. In many there are potential by-passes or short-circuits or short-cuts, and this is no novel concept, for Stirling (1891) used the term "short-cut" in respect of the intrarenal vascular system and circulation, and doubtless one could find much earlier examples of this trend of thought.

Locations of By-passes

Among the organs in which by-passes are stated to occur are the following:

1. *The Skin.*—The occurrence of arteriovenous anastomoses here is so well known that I need not give details.

2. *The Lungs.*—Von Hayek (1940) found, in the human subject, that there were numerous connexions between contractile branches of the pulmonary arteries and the bronchial venous network, and that in consequence there was ample provision for the by-passing of capillaries. In resting laboratory animals Sjöstrand (1934, 1935) reported a patchy lung distribution of intravenously injected indian ink, and I have myself found similar patchy distribution of Evans blue, etc., except when artificially induced asphyxia or hypoxia was necessitating full use of all parts of the lungs. As the

distribution of the injected dyes is variable, one can presume that there are intrinsic mechanisms regulating the tours of duty of the different alveolar regions.

3. *The Stomach.*—Barclay and Bentley (1949) found, in the human subject, that arteriovenous anastomoses in the region of the submucous vascular plexus caused diversion of the blood flow away from the mucous membrane when the sympathetic nerve supply was active: mere handling of the viscus at operation could effect this. Walder (1951) injected glass spheres of 60–180 μ diameter into the fluid perfusing human stomachs removed at operation, and showed that, under various conditions, anastomoses many times wider than the capillary vessels were open. Barlow (1950), finally, by double injection techniques, demonstrated direct type anastomoses in the submucous connective tissue of human stomachs removed at operation or necropsy. Their calibres in fixed specimens were normally 40–60 μ.

4. *The Intestine.*—The villi theoretically need a good blood supply during digestion but not at other times, and mechanisms exist, as Spanner (1931, 1932) showed, for by-passing the capillaries as need arises. In one group, which includes man, the rabbit, rat, mouse, and bat, the arteriovenous anastomoses are within the villi themselves; there are interesting specific variations in the anatomical arrangements within the group. In the second group, which includes the cat, dog, pig, and horse, the anastomoses lie in the submucosa, and again there are specific variations within the group in respect of details. The overall functional implications are presumably similar in man and all the other mammals mentioned.

5. *The Liver.*—Daniel and Prichard (1951) gave a preliminary account of their findings in a number of species, and from it, while awaiting the fuller story, we may extract the following. "The angiographic studies," they wrote, "have indicated that generally the portal venous blood flow is distributed throughout the liver and passes through all the many pathways which exist from hilum to periphery. They have also indicated that on occasion this blood flow is short-circuited, and that in these circumstances the shorter of the intrahepatic pathways, situated in the more central and hilar regions of the liver, transmit the greater part or even all of the flow, whilst little or no portal blood circulates through the longer pathways at the periphery."

6. *The Kidney.*—In the mammalian organ, under a variety of conditions, there can be diversion of part or of the whole of the renal cortical blood flow (Trueta *et al.*, 1946, 1947), and the diversion has been noted in all the mammalian species investigated. During it a varying number of layers of cortical glomeruli, beginning with the outermost, are temporarily shut off from the renal blood flow, and simultaneously there is a variable degree of constriction of the main renal artery in its course from the aorta to the kidney. The conditions of occurrence include acute asphyxia of the subject, when the exclusion of glomeruli is nervously intermediated (Franklin, McGee, and Ullmann, 1949, 1951). The blood which would otherwise have gone to these cortical destinations may be diverted in its entirety to other parts of the body without entering the renal artery at all, for in some asphyxia experiments, simultaneously with the cortical paling, there has also been a reduction in the normal vascularity of the medulla, though some circulation was continuing through it and the renal artery was not fully constricted (Franklin, 1950). On the other hand, the vascularity of the medulla may on occasion be markedly increased (see Fig. 71, and cf. Figs. 22 and 23 in Trueta *et al.*, 1947) during diversion of blood from the cortex, and such findings led to the idea that the basal glomeruli, with their afferent and efferent vessels and the vasa recta into which these latter discharge, could be regarded as by-passing routes. Various other possible by-passes, differing from the above in short-circuiting capillary networks of any kind, have been described by anatomists (see Franklin, 1949a, 1950).

7. *The Uterus.*—Schlegel (1945–6) found "arteriovenous anastomoses" joining arterioles and venous lakes in the stratum functionale of the human endometrium; they were present in increased number with advance in the menstrual cycle, so not unnaturally the author discussed their possible role in menstruation. According to Bartelmez (1947), however, they are non-existent in *Macacus rhesus*, so the *basic* mechanisms of menstruation cannot be dependent upon them (see also Reynolds, 1947).

The above list of locations of by-passes is far from comprehensive if one can rely upon the discoveries of arteriovenous anastomoses* reported *passim* in the literature. It does, however, detail some of the more important and better-documented ones, and it provides sufficient examples for my present purpose, which is to demonstrate that there are routes available for short-circuiting the blood flow to tissues which are temporarily inactive or for other reasons can, in the interest of the body as a whole, be rendered ischaemic over a period of time.

The one with which I have myself had much to do is the renal cortical by-passing, which can be brought into action in circumstances of stress in various mammals,† man probably included (Franklin, 1950), and which would provide the anoxic conditions necessary for the production of renin (Cruz-Coke, 1946; and personal communication, 1947) and of the vasotropic factor V.E.M., to which reference will later be made.

"Orders of Sacrifice"

In the Oxford studies (Trueta *et al.*, 1946, 1947), which led to the idea of a renal cortical by-passing, certain experimental procedures practised upon anaesthetized rabbits led to constriction of the femoral artery, abdominal aorta, and renal artery‡ in that descending order of severity, while the mesenteric artery remained unchanged in calibre or was slightly dilated. Haemorrhage, on the other hand, led to constriction of all the vessels studied, including the mesenteric artery, while a massive dose of adrenaline cut off all the parts supplied by the distal portion of the aorta, increased markedly the size of the heart, and caused widening, lengthening, and serpentine bending of the unconstricted portion of the aorta (see Fig. 13 in Trueta *et al.*, 1947).

These and other findings§ suggested to me in 1946–7 the idea of an order of sacrifice‖—that is, of differential reduction of the blood supply to various tissues and organs in a number of circumstances. It also seemed to me that the incomplete order of sacrifice (skin, limb

*Either in Clara's (1939, p. 2) stricter sense (direct, regularly present communications between the arterial high-pressure and the venous low-pressure systems which by-pass the capillary circulation, and are characterized anatomically by their very specialized structure, and physiologically by their capacity for complete occlusion) or in the looser one employed by some writers (direct communications between the arterial and venous systems outside the capillary circulation). Schlegel (1945–6), for instance, used the term with the latter connotation.

†Professor E. C. Amoroso (personal communication, 1950) added the seal to those already known—the monkey, dog, cat, rabbit, rat, mouse, and guinea-pig—that is, all the laboratory animals so far tested.

‡In control subjects with the splanchnic nerves divided, the renal artery showed no constriction and the renal cortex remained throughout fuller of blood than normally, while the medulla was paler. The other vessels reacted as before.

§For example, those of Rous and Gilding (1929), who found in rabbits and cats that severe haemorrhage resulted in the skin, most of the skeletal muscles, the spleen, the omentum, and the bladder being largely deprived of their blood supply; on the other hand, the muscles used in respiration and in swallowing, the gut, the gall-bladder and liver, the pancreas, the red bone-marrow, and the pregnant uterus were adequately supplied. The authors attempted no detailed study of the kidney.

‖This term contains a suggestion of teleology, so I should like to quote—via Professor Otto Loewi and Dr. W. Feldberg—from E. von Brücke the passage, "Teleology is a lady without whom no biologist can live. Yet he is ashamed to show himself with her in public."

muscles, renal cortex, central nervous system, and last of all the heart) which I then formulated* was perhaps the reverse of the order in which the parts developed their major demands for blood supply (gauged by their degrees of functional activity) during intrauterine and immediate post-natal life. The heart is busy from very early stages and, during the second half of mammalian gestation, is the only obviously active part in the otherwise lifeless-appearing foetus. The central nervous system, according to the findings of Barcroft and Barron in the sheep (résumé in Barclay *et al.*, 1944) attains functional activity progressively from below upwards; the demonstrable onset occurs about a fifth or more of the way towards full term, the nervous influences changing from excitatory to inhibitory, in respect of muscular movement, at about half-term. The renal cortex in many species is still not fully formed at birth,† and before birth excretory functions are subserved mainly by the placenta. Skeletal muscle, after its long period of intrauterine nervously induced quiescence, becomes visibly active at birth, and spikes appear for the first time in the electrical records. Finally, within a few days after birth the skin has settled down to its new duties; *in utero* it has no concern with temperature regulation, etc., and presumably its vessels are also compressed by the surrounding fluid.

While the orders of sacrifice still need much further research in respect of details, I do not wish to stress unduly this order of development, which is at present more hypothetical. It will, however, be most interesting if it is substantiated, for the changes effected slowly at the beginning of the individual's life-span will be shown to correspond in reverse with those often occurring, though usually more slowly, at its end. This will not only help to integrate the full story of the circulation's economy, but will be a guide to further research, as well as the basis for judgment with regard to points which are not readily open to elucidation by direct investigation.

Differential Reactivity of Vessels to Adrenaline

One of my interests since 1947 has been to test further the first hypothesis, and, as a simple beginning, I have collected extra evidence about the differential sensitivity of a number of the rabbit's arteries *in situ* to intravenously injected adrenaline. The rabbit was chosen for the earlier experiments partly because it is easy in this animal to note superficial kidney colour changes, partly because it was at the time the only species of reasonable size that was available in quantity. In the later experiments it was deliberately chosen to avoid the complications introduced, in respect of many other species, by discoveries about the part played by *nor*adrenaline (see, for example, Schmiterlöw, 1948; and others). The medulla of the rabbit's adrenal gland contains mainly or exclusively adrenaline (Holtz and Schümann, 1950; West, 1951); this substance is also more important than *nor*adrenaline in the rabbit for the transmission of autonomic impulses (West, 1951); finally, it definitely appears to be the transmitter in the case of the rabbit's ear vessels (Gaddum, Jang, and Kwiatkowski, 1939; Gaddum and Kwiatkowski, 1939): with regard to the other vessels I have so far failed to find any information.

In the earlier experiments, carried out with the stypven–Evans-blue technique which I have described, I had the co-operation of Professor E. C. Amoroso, but the findings were not published as the work was not complete; nevertheless, it gave useful information as a basis for further studies. Recently, Miss Lindop, Mr. Pearce, and I reported to the Physiological Society the microscopically observed and measured reactions of various arteries to graded doses of intravenously administered adrenaline, and at the same meeting Professor R. H. S. Thompson and Dr. Tickner (1951) provided a complementary story. For they had found that monoamine oxidase was present in varying amounts in the walls of different arteries in the rabbit, and the increase in enzyme activity in their series corresponded, in so far as they and we had studied the same vessels, with the decrease in sensitivity to adrenaline in our series. Finally, I have done some more experiments with the stypven–Evans-blue technique, which has the advantage of indicating, by absence or intensity of coloration, the degree of blood supply to tissues; direct microscopical studies of the reactions of individual arteries give only part of the picture.

With regard to the work carried out by Miss Lindop, Mr. Pearce, and myself, I have to begin by saying that the dosages of adrenaline used were high because in general we decided to take full vasoconstriction as the end-point. In brief, the findings were that the ear arteries required 10 μg. per kg., body wall arteries 20 μg., the femoral artery 25 μg., splenic artery 40–45 μg., renal artery 50 μg., small gastric and intestinal branches usually 100–120 μg., and internal carotid artery 100–120 μg. The vertebral artery seemed to be in the same class as the internal carotid or to require somewhat higher dosage, and technical difficulties made it impossible to see if the blood flow was completely arrested. A posterior spinal artery was very refractory and remained incompletely closed, though its branches were fully constricted, with as much as 200 μg. per kg. The coeliac axis and superior mesenteric artery gave the most varied reactions, dilating or remaining unaffected or constricting, the extremes being slight constriction of the mesenteric artery in one subject with only 5 μg. per kg., and no effect upon either vessel in another subject with 300 μg. per kg.

Order of Reduction in Blood Flows

The new stypven–Evans-blue series has on the whole given comparable results, though in infinitely more detail, as the distribution and intensity of dye-staining throughout the body were noted. On the whole, the two different techniques indicated an order of reduction in blood flows in which the skin and the non-vital skeletal muscles were the first parts to suffer; later came the spleen and the renal cortex, and, very late, the brain and spinal cord. The different parts of the alimentary canal, however, as also a number of other viscera, showed considerable variations from animal to animal, and on occasion some were still within the circulation when the central nervous system was out. Control stypven–Evans-blue experiments without adrenaline showed that variations were possible in the differential staining of the alimentary canal and other organs, and one presumes that in respect of the former these variations can be correlated with degrees of digestive and absorptive activity.

In the human patient, however, as I shall mention later, there is not in general a preferential blood supply

*Since that time I have thought in terms of orders rather than of a single order.

†Extra layers of glomeruli are still being added on the outside except in those species in which the newborn animal sees, feeds, and moves about actively.

to viscera while the central nervous system supply is reduced, and the anomalous findings mentioned must be ascribed to the fact that the experiments were done on healthy anaesthetized subjects. In other words, the problem put to the body as a whole—namely, how it would deal with a full blood volume when the skeletal musculature was generally inactive, and adrenaline, often in high dosage, was introduced was fundamentally an unfair one. As Rothlin (1920) and many since have shown, isolated or perfused mesenteric and several other visceral arteries react to adrenaline by constriction; that on several occasions in our experiments they were irresponsive or dilated must mean that they were nervously inhibited or, though this seems on other evidence less likely in the cases of certain vessels, that their natural tendency to contract was overcome by the raised blood pressure.

Studies of animals after haemorrhage and during shock of various kinds much more closely imitate the conditions met with in patients, and experiments already mentioned, as well as others described in the literature, show that during haemorrhage the arteries, with some exceptions, constrict; certainly the mesenteric ones do so. Further, the liver seems to come more definitely in place in respect of reduction of blood supply; it appears to follow after the renal cortex, in Van Slyke's (1948) view, for he found "that in the dog, the function of the kidney is abolished by haemorrhage before that of the liver." Delorme (1951), however, took the line that the liver may be earlier or more gravely damaged than the kidney in vasoconstrictive states. It is, he wrote, "more susceptible to anoxia than either muscle or kidney (Russell *et al.*, 1944); although less sensitive than the cerebral cortex, it does not possess the protective circulatory adjustments of the latter (Gellhorn, 1943); moreover, the liver is unique among body tissues in that it depends on venous blood for the larger part of its oxygen supply."

[*The second lecture, with a list of references, will appear in our next issue.*]

The 27th Annual Report of the British Empire Leprosy Relief Association (1950) announces that since January five more lay workers and two nurses have been sent overseas. Five years ago B.E.L.R.A. resolved to recruit six doctors for overseas work, but so far only one of them has been appointed; in more than one area the progress planned has been frustrated for lack of medical supervision. Especially in East Africa the field is open. B.E.L.R.A. is aiming to help to the utmost in the establishment and staffing of leprosaria planned at key points and in the development of those selected for expansion. Lay workers are available, but some of the schemes may well have to be further postponed unless doctors and nurses can be found. The organization has always aimed to save the children before leprosy destroys them, and at the end of 1949 there were 1,500 B.E.L.R.A. adoptees. Dr. Ross Innes (Inter-territorial Leprologist for Kenya, Uganda, and Tanganyika) has completed a massive survey and made recommendations; on the basis of an examination of 362,000 persons throughout the area he estimates an incidence of 80,000 cases in Uganda, 35,000 in Kenya, and 100,000 in Tanganyika, with an average of 10 per 1,000 in Kenya, and 18 in the other two territories. As yet only 6,850 of them are receiving treatment. The report also notes that in Britain the outstanding achievement was the collection of almost £13,000 from the appeal broadcast by a cured leper in January, 1949, and when an anniversary letter was sent the following year to all those who had responded to the appeal, over 25% again contributed.

LOW-SALT DIET IN TREATMENT OF CONGESTIVE HEART FAILURE*

BY

A. LEVIN NIELSEN, M.D.

P. BECHGAARD, M.D.

AND

H. O. BANG, M.D.

(From Medical Departments 2 and 7 of the Municipal Hospital, Copenhagen, and the Medical Department of the County Hospital, Aarhus, Denmark)

Up to the turn of the century a diet low in sodium chloride was used most successfully in the treatment of oedema and other symptoms of congestive heart failure (Karell, 1866; Strauss, 1903; Widal and Lemierre, 1903; Finsen, 1904). After the introduction of mercurial diuretics the low-salt diet was used much less because these diuretics were more dramatically effective and easier for the patient than the slow and complicated treatment by dieting. In the English-speaking world in particular (Lewis, 1933; Levine, 1940; White, 1947) it became usual to treat cardiac oedemas with only a moderate or casual salt restriction and with mersalyl ("salyrgan") and a restricted fluid intake. Although many German (e.g., Volhard) and French physicians continued to treat their patients with the low-salt diet, Allen (Allen and Sherill, 1922) seems to be the only American in recent times to have done so on a large scale, and his chief interest was the effect of the salt restriction on hypertension.

During and after the last war, however, the tide again changed, and now great importance is attached to the usefulness of a low-salt diet, and very intensive research is being carried out to investigate the importance of sodium chloride or sodium to the physiology of the organism. This new development began with the publication of a number of clinical reports by Schroeder (1941), Schemm (1942), and Kempner (1944). The results of their investigations have received universal recognition (White, *et al.*, 1946), and have been supported by physiological and pathological investigations on the pathogenesis of congestive heart failure by Warren and Stead (1944) among others.

Schroeder demonstrated in 23 cases of cardiac oedema that a decrease in the consumption of salt to an amount less than the salt content of the urine was always accompanied by a decrease of oedema. Furthermore, he showed clearly that the low-salt diets hitherto used were not sufficiently low in salt, and that a limitation to 1 g. in twenty-four hours was often necessary to achieve a decrease of oedema or merely to prevent its increase. He also demonstrated the very interesting point that a decrease in the amount of the fluid intake on such a low-salt diet had no effect in decreasing the oedema—in fact, in some cases oedema disappeared more readily when the patient was given more water. In 1944 Schemm's second report gave the results of eight years' treatment of 241 patients with oedema, 90% with cardiac oedema. He successfully used a low-salt, acid-ash diet together with a larger intake of water, if possible 3–4 litres a day. Finally, Kempner (1944) in his study of the effect on hypertension of a diet

*This work was supported by a grant from the King Christian X Foundation.

consisting chiefly of unsalted rice showed that this low-salt diet was effective in oedematous hypertensives. Heintzelmann (1949), in Denmark, has described the effect of a low-salt diet in the treatment of congestive heart failure.

Recent investigations, done with the aid of radioactive sodium, have demonstrated that patients with congestive heart failure retain much more of the tracer sodium than normal people (Threefoot *et al.*, 1949). The sodium as a diffusible ion accumulates in the blood and extracellular fluid, together with chloride, bicarbonate, and protein, and for osmotic reasons the retained sodium holds water. In the formation of oedema the retention of water is thus secondary to the retention of sodium. If the patient is brought into a state of negative sodium balance the result is the clearing or diminution of oedema. Patients with congestive heart failure are often thirsty, because the oedema fluid is not water but a salt solution, and a relative true dehydration—that is, a deficit of plain water—may be present.

As a result of these facts a rational approach to the treatment of cardiac oedema appears to be: (1) a decrease in the intake of sodium (diet); (2) an increase of sodium excretion (mercurial and acid diuretics); (3) improvement of the action of the heart and circulation of the blood (digitalis, oxygen, rest, etc.); and (4) an *ad lib.* intake of water, which is both permissible and desirable if the first three factors are in force.

The work reported in this paper was designed to determine whether a diet containing less than 1 g. of salt in 24 hours is of such importance and advantage in the treatment of congestive heart failure that it should be made part of the regular routine. The diet used was the same as that used in our previous study of the effect of sodium restriction in patients with hypertension (Bang, Bechgaard, and Levin Nielsen, 1949). It contained about 260 mg. of sodium and about 2,000 calories.

The material consisted of 64 patients (35 males and 29 females) between the ages of 40 and 84; average age 62. All were suffering from congestive heart failure, and manifested oedema and/or cyanosis, pulmonary passive congestion as verified by *x*-ray film, attacks of dyspnoea, and pulmonary oedema.

The following four cases are presented in some detail. Their severe congestive heart failure showed no improvement with the usual methods of treatment, but responded after they were given a low-salt diet.

Case 1

A housewife aged 44 had had chorea at the age of 12 and rheumatic fever at 17. At 29, during her second pregnancy, cardiac symptoms appeared, and these have troubled her since. At 37 she was admitted to hospital for rheumatic fever, and mitral stenosis was noted; since then she has had increasing palpitation of the heart, dyspnoea on exertion, and oedema, and has constantly received digitalis and mersalyl. She entered hospital for congestive failure six months before the present admission.

When admitted on September 28, 1948, she had shortness of breath, exhaustion, and marked oedema, and a sense of fullness under the right costal margin. She had been up and about, but required several hours of intermittent rest a day. Her weight was 55.8 kg., and height 164 cm. She was weak, cyanotic, and markedly dyspnoeic at rest. The action of the heart was tumultuous (irregular irregularity). The apex beat was in the mid-clavicular line; there was a rough systolic apical murmur, but no palpable thrill; B.P. 110/95. Crepitant rales were heard at bases of both lungs. The liver edge reached to the umbilicus; there was dullness in the flanks, and marked oedema of the lower extremities and over the lumbar area.

An electrocardiogram revealed auricular fibrillation and negative ST_2 and ST_3 segments. *X*-ray examination showed mitral configuration, 17/29 cm., and pulmonary passive congestion. Haemoglobin, 110%; sedimentation rate, 36 mm.; urine, albumin +; microscopical examination, normal; blood urea, 32 mg. per 100 ml.

Treatment.—With a full diet containing the usual amount of salt, digitalis, 0.3 g. and, later, 0.1 g. daily, mersalyl, 2 ml. twice a week, and urea, 45 g. daily, the condition of the patient grew gradually worse in the course of five weeks, with increase in her oedema and a weight gain of 7.7 kg. Without other change in the treatment during the preceding month the patient was put on a low-salt diet. Within a few days her weight began to fall and at the same time her dyspnoea and oedema disappeared. After five weeks on the low-salt diet her weight loss amounted to 17 kg., and there was only slight evening oedema of the lower extremities. Since then the patient has done light housework at home for six months on the low-salt diet with digitalis and oral urea daily and mersalyl twice a month. Her weight has increased only 2 kg.

Comment.—This 44-year-old woman with congestive heart failure (rheumatic heart disease with mitral stenosis) became worse in spite of rest in bed for a considerable length of time and in spite of digitalis, mersalyl, and urea. Institution of a low-salt diet, with no other change, brought about immediate decrease of oedema and overall clinical improvement. After discharge on a low-salt diet, digitalis, and mersalyl she has not suffered noticeably from symptoms of congestive heart failure during the past six months.

Case 2

A male window-cleaner aged 39 had been in hospital at the age of 7 and 22 with rheumatic fever and at 32 for pneumonia. During the past three years he had increasing fatigability, dyspnoea on exertion, ankle oedema, and pressure in the epigastrium. He also had several severe and sudden attacks of extreme dyspnoea with a feeling of oppression lasting several hours. At 38 he had severe haematemesis. He was admitted to hospital 18 months previously on account of congestive heart failure; he had been receiving digitalis for many years, and was unfit for work during the last six months.

He was admitted to hospital on February 14, 1949, complaining of shortness of breath and the fear of death. He was not weighed; his height was 168 cm. Marked prostration, dyspnoea, and cyanosis were present. The apex beat was not felt. There were an apical thrill and a pre-systolic murmur, accentuation of P_2, sinus rhythm, and an apex rate of 120 a minute; B.P. was 140/85. The lungs showed: dullness at both bases, and fine moist rales of pulmonary oedema. Signs of ascites were not present; the liver edge was three fingerbreadths below the right costal margin, and there was no peripheral oedema.

An electrocardiogram revealed sinus rhythm, right axis deviation, large P waves in Lead II, and slight depression of ST_2 and ST_3 segments. *X*-ray examination showed mitral configuration and severe pulmonary passive congestion. The haemoglobin was 95%; sedimentation rate, 8 mm.; urine, albumin +; microscopical examination, normal; blood urea, 42 mg. per 100 ml.

Treatment.—Morphine and oxygen given on admission brought no relief. The expectoration of large amounts of frothy red-tinged material disappeared after a 200-ml. venesection and aminophylline and morphine by vein. He was given penicillin the first few days. After the venesection he remained very weak, with continuous dyspnoea and very little sleep. He received a daily dose of digitalis. After three weeks in bed he still complained of shortness of breath,

fullness in the epigastrium, and thirst. At night he was very confused, had severe attacks of dyspnoea, and suffered much from thirst. Oedema of the legs developed. In spite of mersalyl, diuresis was scant and the oedema increased, so that after 12 days a low-salt diet was begun without otherwise changing the treatment. Two days later the urine output had risen to 1 litre, and mersalyl then brought it up to 3 litres. The patient could not be weighed the first few days, but the oedema disappeared, and so at the same time did the patient's thirst. The dyspnoea, the fullness in the abdomen, and his restlessness at night ceased. The patient was able to leave his bed, but the advanced condition of his heart disease permitted only partial improvement, and continued hospital treatment was necessary. He died three months later.

Comment.—This 39-year-old man with congestive heart failure (rheumatic heart disease with mitral stenosis) had repeated attacks of pulmonary oedema. On his admission to hospital there was no improvement in the severe signs of congestive failure and thirst, in spite of rest in bed, digitalis, and mercurial diuretics. After institution of a low-salt diet with no other changes the more distressing symptoms, including the thirst and the oedema, which had developed under observation, were greatly relieved, though the patient remained unfit for work.

Case 3

An old-age pensioner aged 64 had no history of rheumatic fever or venereal disease. He entered hospital in December, 1947, with bronchitis; swelling of the legs was noted. Digitalis was begun when he was again in hospital in May, 1948.

He was readmitted on June 10, 1948, with congestive heart failure, complaining of increasing shortness of breath on exertion and while at rest. His weight was 71.2 kg.; height 170 cm. He perspired and was dyspnoeic; the veins of his neck were much distended. The apex impulse was in the anterior axillary line, the heart sounds were hammer-like, with persistent irregularly irregular rhythm and an apex rate about 60 a minute. B.P. was 200/130. Lung bases showed dullness, impaired breath sounds, and rales. The liver edge was four fingerbreadths below the right costal margin; there was no detectable ascites, but moderate oedema of the legs.

An electrocardiogram revealed auricular fibrillation, deeply inverted T_1 and T_2, and a ventricular rate of 80 a minute. *X*-ray examination showed the heart greatly enlarged, 18/28 cm., and severe passive congestion of both lung bases; no pleural fluid. The haemoglobin was 112%; sedimentation rate, 4 mm.; urine, albumin +, microscopical examination normal; blood urea, 22 mg. per 100 ml.

Treatment.—The day after admission Cheyne-Stokes respirations and his general condition were improved by venesection (400 ml.) and morphine, but in the next few days he grew restless, with dyspnoea and mental confusion. Ammonium chloride had to be stopped after five days on account of nausea. His condition deteriorated, and because of dyspnoea he sat up day and night. On the eighth day treatment with the low-salt diet was started, but to begin with he could eat only half the food. After six days on this diet his condition was noticeably improved. The B.P. fell to 150/100, dyspnoea decreased, diuresis increased (but on account of mental confusion could not be measured exactly), and weight fell 5 kg. After a further 10 days he could sit up, and his mind had cleared. The oedema had disappeared and his weight had fallen another 4 kg. He was sent home on the 67th day.

His condition was then bearable. He continued on a low-salt diet, but still had slight oedema of the legs, and was admitted to the hospital again four months later in order to clear his oedema completely. After this he was so well that he bought a tricycle. On July 20, 1949, he was admitted on account of hypostatic pneumonia.

Comment.—This 64-year-old man with hypertensive heart disease showed marked congestive heart failure with extreme dyspnoea and cyanosis, which did not improve after eight days in bed, with digitalis, ammonium chloride, and mercurial diuretics. After a low-salt diet was begun there was a fall in blood pressure, a loss of oedema, and marked general improvement. With continuation of the low-salt diet he was later admitted because of slight oedema of the legs, and again with hypostatic pneumonia, but his condition in the intervals between these readmissions was considerably better than before he began the low-salt diet.

Case 4

A grocer aged 56 had had scarlet fever at the age of 8, but no diphtheria, rheumatic fever, or venereal disease. He had always eaten too much, had taken fairly large amounts of alcohol earlier, and was obese, weighing 92–95 kg. Diabetes was known to exist since the age of 42; he had had no insulin. He had urolithiasis at 53. At 54 he entered hospital for arteriosclerotic heart disease with dyspnoea, and had been treated since with an ordinary diet without sugar and with mersalyl, and later theophyllin and digitalis leaf, 0.1 g. a day. He had increasing dyspnoea, especially at night, over the past 12 months and oedema of the legs during the past three weeks.

He was admitted on February 15, 1949, for congestive heart failure, with dyspnoea, pressure in the chest, oedema, and severe suffocative paroxysmal nocturnal dyspnoea, which forced him to sit up in order to sleep. His weight was 83.4 kg.; height 164 cm. He was weak, dyspnoeic, cyanotic, and extremely orthopnoeic. The heart size was indeterminable; heart sounds were of very poor quality; rhythm irregularly irregular; apex rate, 78; B.P. 100/60. The liver edge was palpable a hand's breadth below the costal margin; no ascites was detectable.

An electrocardiogram revealed auricular fibrillation, T waves iso-electric, and low-voltage QRS complexes in standard leads. *X*-ray examination showed the heart shadow not enlarged, 16/34 cm., and pulmonary passive congestion, without fluid. The haemoglobin was 95%; sedimentation rate, 4 mm.; urine, albumin +; blood urea, 38 mg. per 100 ml.

Treatment.—For one week he was on a diet without sugar but with the ordinary amount of salt, with digitalis, 0.3 g. and later 0.1 g. daily, and mersalyl. There was no change in his general condition or in the oedema, and he continued to complain of severe dyspnoea at night. In the next 10 days, after removing the salt from the diet, diuresis increased, the weight fell by 5 kg., and the dyspnoea, including the nocturnal attacks, disappeared. He was discharged three weeks later in good condition, having lost a total of 14 kg. in weight. He continued on the low-salt diet without sugar, with digitalis daily and a mersalyl suppository twice a week, without any recurrence of signs or symptoms for the next two months, when he died suddenly, presumably of an acute coronary thrombosis.

Comment.—This 56-year-old man with obesity, diabetes, and arteriosclerotic heart disease with severe congestive failure did not improve in spite of rest in bed, digitalis, and mercurial diuretics. After the institution of the low-salt diet without other change, his condition improved, and he was discharged. His improvement was maintained without any return of symptoms until sudden death two months later.

General Comment on Above Cases

The data from these four patients with severe congestive heart failure are presented in some detail. To obtain a true picture of the effect of the low-salt diet

we first tried to ascertain whether the usual methods of treatment (confinement to bed, digitalis, mercurial diuretics) resulted in an improvement in the condition. Only when this method failed were the patients transferred to a low-salt diet. Changes in weight, together with observation of the changes in oedema, were used as objective criteria of the patients' condition. The changes in subjective symptoms—dyspnoea, cyanosis, palpitations, pains, sleeplessness, fatigue, etc.—however, could only be described. There was no doubt about the results: the low-salt diet led to a dramatic change in the condition of these patients in a few days. It was also noted that without salt restriction the diuretics brought about only a temporary decrease in the oedema, but that their effect when used with this diet was greater and more lasting. The latter result is naturally due to the fact that on a low-salt diet there is much less possibility of the oedema re-forming rapidly.

General Observations and Follow-up Studies of the 64 Patients

Having seen the good results of the low-salt diet, we began to use it on patients fairly soon after their admission to hospital as a supplementary therapy in nearly all cases of congestive heart failure. We also used it in some of the cases which could have been treated without the low-salt diet. In these cases the good effects of the treatment can best be judged by examining the after-effects. We have examined these patients to see whether those who kept to the low-salt diet fared better than those who did not.

Attention must be drawn to the fact that all of these patients were suffering from severe heart disease and had a very doubtful prognosis even on a low-salt diet. On account of the relatively small number of cases no great importance can be attached to the difference in the death rate in the two groups, though on analysis it does favour the patients who followed the diet. It is more important to examine the degree of the symptoms of congestive heart failure in the two groups.

Table I shows the results of the treatment of all 64 cases in the hospital period. The low-salt-diet treatment in the hospital resulted in decisive improvement

TABLE I.—*Result of Hospital Treatment of 64 Patients with Congestive Heart Failure*

Type of Heart Disease	No. Treated	Markedly Improved	Slightly Improved	Unchanged	Worse	Died
Rheumatic ..	11	3	7	0	11	1
Arteriosclerotic	30	21	5[2]	0	4[4] 6[6] 7[7]	5
Hypertensive	23	12[3]	9	1	1[8]	2
Total ..	64	36	21	1	6	8

Causes of death.—[1] Adhesive pericarditis, aortic, and mitral stenosis. [2] Cholecystitis. [3] Cerebral embolus. [4 5] Coronary occlusion. [6] Congestive heart failure, coronary sclerosis. [7] Congestive heart failure, adhesive pericarditis. [8] Uraemic, nephrosclerosis.

in 36 and slight improvement in 21; six of the patients grew worse and died; in one there was no change. Two others died of intercurrent diseases. The causes of death are given at the foot of the table.

After their discharge from the hospital (see Table II) 50 of the 56 survivors from the original 64 were examined from three to eighteen months later. The length of time between discharge and observation is approximately the same for the group that followed the diet and the group that did not. In 27 out of the

TABLE II.—*Follow-up Study of 50 of the 56 Survivors After Discharge from the Hospital*

Type of Heart Disease	No.	Continued Low-salt Diet				Off Low-salt Diet			
		No.	Condition Maintained	Worse	Died	No.	Condition Maintained	Worse	Died
Rheumatic ..	9	4	3[9]	1[10]	2	5	2	3[12] 1[13] 1[14]	3
Arteriosclerotic	22	17	16	1[11]	1	5	0	5	0
Hypertensive	19	10	8	2	0	9	1	8[15] 1[16]	2
Total ..	50	31	27	4	3	19	3	16	5

Causes of death.—[9] Endocarditis lenta. [10 11] Congestive heart failure. [12 14] Pulmonary oedema. [13] Anasarca (congestive failure). [15] Congestive heart failure. [16] Coronary occlusion.

31 patients who continued the diet their condition remained the same as when they left the hospital; in four the condition had deteriorated, and two of these had died. Nineteen patients did not continue the diet—in three the condition was unchanged, but 16 had deteriorated, and five of these had died, all of congestive heart failure.

Discussion

Time and again at these follow-up examinations we have been able to ascertain a relation between discontinuation of a diet and a deterioration in the patient's condition, an increase in weight, and greater excretion of chloride in the urine. This is not contradicted by the fact that several of the patients have continued in good health on a diet with a greater salt content than prescribed. This even applied to patients who originally were improved only with difficulty with the aid of a low-salt diet in addition to the usual treatment. It can therefore be assumed that the salt tolerance may rise simultaneously with the general clinical improvement in the patient's condition (see Case 1). This means that some patients do not have to continue with the low-salt diet, but are able to live on a more normal diet—for example, simply without table-salt and salted dishes—or often with ordinary bread-and-butter. By watching the patient's general clinical condition, weight, and chloride excretion in the urine one knows whether he is keeping to the diet and, if this is not the case, whether a discontinuation of the more rigid features of the diet is permissible. In cases of incipient congestive heart failure it can be decided on the same basis whether a return to the low-salt diet alone may be expected to improve the condition or whether diuretics are necessary.

Our observations seem to show that if the patient's weight remains the same the sodium chloride content of the urine will correspond more or less to the amount consumed. In cases of increasing weight alone, due to the formation of occult oedema, the excretion is less, and when the oedema decreases again the excretion is greater. Excretion of salt rises violently with mersalyl diuresis; an excretion of 20 g. or more of sodium chloride in 24 hours may be observed. With the aid of mercurial diuretics, temporary relief may be obtained by the excretion of the retained cooking-salt, but if the salt consumption is not decreased, patients will again retain salt, and oedema will again be the result. By keeping to a low-salt diet a more stable condition is achieved than if the oedema is allowed to reproduce. It is possible that this greater stability and continued freedom from occult oedema is the reason why some patients feel much better on a low-salt diet than on an

ordinary diet with diuretics. But all patients will not or cannot tolerate the low-salt diet often necessary to prevent oedema. In these cases diuretics must be administered with a diet heavier in salt or possibly combined with a weekly saltless day, with unsalted thin oatmeal gruel or boiled rice as the only food.

Formerly one of the methods of treatment of patients with a predisposition to oedema was to reduce the consumption of fluid. When a low-salt diet is used, however, a reduction in the amount of fluid is not necessary; in fact, a fluid consumption which ensures fairly large diuresis (2–3 litres every 24 hours) seems to be the most effective, as an output of 2–3 litres of urine has been shown to give a larger excretion of salt. When allowing the patients plenty of water it must be borne in mind that some water is relatively high in sodium. In Copenhagen, for example, the sodium content of tap-water varies from 9 to 131 mg. per litre, with an average of 50 mg.

Finally, we should like to review the symptoms and signs in which improvement has been observed on a low-salt diet. The effect on the oedema was the easiest to demonstrate. The low-salt diet, and especially the combination of this diet with digitalis, mercurial diuretics, and sometimes ammonium chloride and urea, is the treatment which most readily causes the disappearance of oedema in patients suffering from heart failure. The most striking example of the effect of this treatment was seen in the case of a 64-year-old oedematous woman who lost 27.6 kg. in two months. Both *dyspnoea at rest* and *attacks of dyspnoea* at night often improve or cease altogether, generally after a few days' treatment. We observed good results in many cases, particularly in patients suffering from nocturnal dyspnoea. A number of patients who in spite of morphine had slept badly for a long time soon slept better with this treatment (see Case 4).

A true dehydration from a deficit of plain water, which is often found in oedematous patients, results in the symptoms of an intense thirst and a dry tongue. The symptoms may be present even if the patient's consumption of fluid has not been decreased, and these symptoms are often the first to disappear when the patient is put on a low-salt diet. This is a great relief to patients, but means that they must be encouraged to drink plentifully to ensure a fairly large diuresis.

The *blood pressure* in hypertensive subjects often falls during the treatment (Bang *et al.*, 1949).

With the diet used we did not observe any signs of a lack of salt—that is, fatigue or weakness—but many of the patients complained of the tastelessness or uniformity of the diet. There are, however, two diseases which necessitate care when using a low-salt diet: in cases of advanced kidney disease in which the kidneys are not able to retain sufficient sodium a low-salt diet may mean a definite deterioration of the condition of the patient, with hypochloraemia and acidosis; similarly, in cases of Addison's disease a low-salt diet may bring about a typical crisis.

Summary

Sixty-four patients suffering from congestive heart failure with oedema were, in addition to the usual treatment with confinement to bed, digitalis, and diuretics, treated with a low-salt diet (less than 1 g. of sodium chloride a day).

A detailed case history is given of four of the patients in whom the critical condition was not improved until they were transferred to a low-salt diet.

Follow-up studies were made on 50 of the cases in the series. Thirty-one had kept on with the low-salt diet, and 27 of these continued in as good health as on discharge, one was worse, and three had died.

The results are discussed, and the effects of mercurial diuretics and a low-salt diet are compared.

The restriction of the fluid intake is not necessary or beneficial for the patient with oedema on a low-salt diet.

In some cases of chronic kidney disease with loss of normal ability to conserve sodium, and in Addison's disease, sharp restriction of salt is contraindicated.

For valuable criticism and final preparation of the manuscript we are most grateful to Dr. F. R. Schemm, Great Falls, Mont., U.S.A.

References

Allen, F. M., and Sherill, J. W. (1922). *J. metab. Res.*, **2**, 429.
Bang, H. O., Bechgaard, P., and Nielsen, A. Levin (1949). *British Medical Journal*, **2**, 1203.
Finsen, N. R. (1904). *Ugeskr. Laeg.*, **47**, 145.
Heintzelmann, F. (1949). *Nord. Med.*, **42**, 1829.
Karell, P. (1866). *Arch. gén. Méd.*, **2**, 513, 694.
Kempner, W. (1944). *N.C. med. J.*, **5**, 125.
Levine, S. A. (1940). *Clinical Heart Disease*, pp. 322, 495. Saunders.
Lewis, T. (1933). *Diseases of the Heart*, pp. 27, 287. Macmillan.
Schemm, F. R. (1942). *Ann. intern. Med.*, **17**, 952.
—— (1944). Ibid., **21**, 937.
Schroeder, H. A. (1941). *Amer. Heart J.*, **22**, 141.
Strauss, H. (1903). *Ther. d. Gegenw.*, **44**, 433.
Threefoot, S., Burch, G., and Reaser, P. (1949). *J. Lab. clin. Med.*, **34**, 1.
Warren, J. V., and Stead, E. A. (1944). *Arch. intern. Med.*, **73**, 138.
White, P. D. (1947). *Heart Disease*, pp. 790, 1025. Macmillan, New York.
—— Bridges, W. C., and Wheeler, E. O. (1946). *Trans. Ass. Phys.*, **59**, 53.
Widal, F., and Lemierre, A. (1903). *Bull. Soc. méd. Hôp. Paris*, **20**, 678.

RADIATION, LIGHT, AND ILLUMINATION*

BY

J. N. ALDINGTON, B.Sc., Ph.D., F.R.I.C. F.Inst.P., F.I.E.S., A.M.I.E.E.

The visual mechanism is normally stimulated by radiation lying within the comparatively narrow region of from 4,000 A to 7,000 A. In nature the source of this radiation is the sun. In the highly complicated structure of modern society, however, man has found it necessary to devise artificial means for the production of light. I shall therefore concern myself to some extent with radiation generally, but more particularly with the limited region in the radiant energy spectrum known as light to which the human eye responds and with artificial light sources.

In trying to present a picture of the evolution of modern light sources in historical perspective it is necessary to consider certain primary matters in connexion with radiation, light, and illumination. Whereas the eye has evolved through many ages under the continuous radiation from the sun, it has from the beginning of time been subjected to a more limited region of the visible spectrum in the perception of colour. It is this fact which led lamp-research physicists to believe that if in the course of the evolution of light sources they had to produce and put before the public lamps giving discontinuous spectra no harmful results would thereby occur.

*Read to the Section of Ophthalmology at the Annual Meeting of the British Medical Association, Liverpool, 1950.

Artificial Light and the Human Eye

It seems probable that if, by the evolutionary process of time, part of the human body has come to function in a particular way and is then subjected for long periods to some other condition short-term or long-term damage may result. It was considered that the matter might be of importance in respect to the human eye in view of the evolution of modern electric-discharge lamps primarily intended for street lighting. The sodium lamp, for example, gives a practically monochromatic yellow light, while the high-pressure mercury lamp has dominant spectral lines in the yellow, green, and violet regions of the visible spectrum. There has thus been a break with tradition, as up to about 1930 practically all normal light sources gave continuous radiation similar in character to the radiation from the sun. It is interesting to record that after nearly twenty years' practical experience with these sources there is no evidence of damage to the visual mechanism. Indeed, a number of observers have reported an increase in the visual acuity under the light of the plain electric discharge.

If we study the spectrum of radiant energy we see at the short wavelength end the region of *x* rays merging into the ultra-violet region and ultimately into the visible spectrum. Beyond the visible spectrum the infra-red region extends until ultimately we reach the wavelengths which are used for radio transmission. It is a most interesting fact that practically all sources of light emit radiation extending far beyond the visible region and to that extent are less efficient in stimulating the visual mechanism than they would be if the radiation was confined within the 4,000 to 7,000 A waveband. The research physicist, therefore, in considering the development of light sources has to be very conscious of the properties of the human eye. He has not only to consider the need for giving the maximum possible amount of radiation in the visible region but also the sensitivity curve of the normal eye and its differential response from the blue to the red end of the spectrum. If a given source of energy produced monochromatic light at 6,500 A the efficiency of the source in terms of lumens per watt would be only one-tenth of the efficiency which would be produced by the same amount of energy radiating at 5,550 A at the peak of the visibility curve.

Illumination Levels

If we look at these general facts from a mathematical point of view we find that a watt wholly converted into visible radiation will produce theoretically between 600 and 700 lumens. In other words, one watt converted into visible radiation at the peak of the luminosity curve would give about the same amount of light as a 40-watt tungsten-filament lamp. As, however, we are concerned in general with white or near-white light sources it is wise to consider what would happen if the whole of the radiant energy was emitted in the visible spectrum, but so distributed as to give white light.

If this ideal condition was attainable in practice the efficiency would be something of the order of 220 L/W. It is interesting to compare this value with that of 10 to 15 L/W for small incandescent tungsten-filament lamps of the type used in domestic premises and of 70 L/W or so for the efficiency of sodium lamps such as those used for street lighting. Somewhere between these two limits we have the efficiency of practically all electric lamps in common use—for example, the efficiency of a modern fluorescent lamp is of the order of 40 to 50 L/W.

It was the development of the electric discharge lamp in the many forms now available to the public which enabled electrical energy to be more efficiently transformed into light than was possible with the tungsten lamp. These developments have reached maturity only within the last two decades, but, because of them, higher illumination levels have become economically possible and therefore to some extent they bear upon the work of the ophthalmologist.

When we try to trace the evolution of artificial-light sources we find evidence of early forms of the oil-wick lamp dating back more than 70,000 years. It is interesting to note that the modern oil-lamp is very little different in principle from the early forms discovered among the ruins of ancient civilizations. In each case a combustible oil burns at a wick and produces a flame which gives light.

The Electric Lamp

It is now more than one hundred years since the principles underlying the incandescent electric lamp were discovered. Very briefly the electric lamp depends on the fact that when an electric current passes through a conductor the temperature is raised. Under suitable conditions the conductor will incandesce and emit light. At first the distribution of radiant energy from the heated body lies entirely in the infra-red region, but at a temperature of the order of 500° C. the energy curve of the heated body intercepts the visibility response curve of the human eye and red light is seen. With further increases in the temperature of the incandescent body there is a gradual shift in the radiant energy spectrum towards the peak of the visibility curve. The effect of this shift is to cause the emitted radiation to become gradually more white and at the same time to produce an increase in the efficiency of light production as more of the radiant energy falls within the visible region.

If it were possible to produce an incandescent body which could be maintained at a temperature of the order of 6,500° K, then the maximum possible efficiency would be produced, as at this temperature the radiant energy distribution would peak about the region of maximum visibility—that is, at about 5,500 A. With further increase in temperature above this value, if this were possible, there would be a gradual decrease in the efficiency of light production, as increasing amounts of radiation would be emitted in the ultra-violet region.

Increasing Efficiency

In the design of any light source, therefore, the lamp physicist is vitally concerned with producing those operating conditions which will enable the maximum percentage of the total input energy to be emitted in the visible region. In this connexion it is interesting to note that the first successful carbon-filament lamps made available in about 1879 by the work of Swan, in England, and Edison, in America, operated at about 1.4 L/W. Later, by depositing on the carbon filament a more coherent layer of carbon, it was found possible to increase the efficiency to about 4 L/W. The use of tungsten, operated in the form of a thin wire *in vacuo*, brought the efficiency to about 10 L/W for a lamp designed for a life of 1,000 hours. The advent of the gas-filled lamp enabled efficiencies of about 15 L/W to be obtained in a small lamp, while 25 L/W is a common

efficiency for a tungsten-filament projection lamp designed for a life of 50 to 100 hours.

The important thing to note in all these changes is that the progressive improvement in efficiency has been brought about by operating the filament at a higher temperature. It should be noted that, whereas tungsten has the highest melting-point of any metallic element, it cannot be operated above about 3,500° K without the risk of fusing. This temperature is, however, still some 3,000° below the maximum theoretical value for an incandescent body producing light with the optimum efficiency.

For a given lamp, while any increase in the filament temperature will result in increase in the efficiency of light production, it can be obtained only at the expense of a reduced life. This is a fact of nature which is not generally realized. In general the life of a tungsten filament varies inversely as the thirteenth power of the applied voltage. In more simple terms, if a tungsten-filament lamp designed for 230 volts is operated at 240 volts the life will be reduced to approximately one-half—that is, a lamp life of 1,000 hours will be reduced to 500 hours.

Practical Aspects

Our consideration so far has been limited to certain general points relating to the design of tungsten-filament incandescent lamps, and we must now consider one or two practical aspects. It is necessary in most types of incandescent lamp—and there are many hundreds of different types—so to design the tungsten filament that the light is emitted from a comparatively limited area within the lamp bulb. This limitation in area is generally effected by coiling the filament into a fine spiral. In this way about a yard (0.9 metre) of wire can be made into a helix only about 2 in. (5 cm.) in length for the single coil lamp and about 1 in. (2.5 cm.) in length for the coiled coil type. In projection lamps the filament coil may be further formed into a grid of either the single or the biplanar type.

Low-voltage lamps for projection purposes can now be made with very compact filament formations of high brightness. In the solid source type several short stiff filaments are mounted parallel to one another to form a rectangular unit which can be raised to a very high brightness. In the tungsten ribbon lamp the filament consists of a thin strip of sheet tungsten. In each of these cases the glass envelope, after exhaustion, is filled with an inert gas, generally argon. The purpose of the argon filling is to reduce the rate of evaporation of the tungsten during the life of the lamp and thereby to enable the filament to be operated at a higher temperature and efficiency.

In the special cap-fitting or hand lamps used by coal-miners the gas filling is now krypton, which because of its low thermal conductivity enables about 20% more light to be produced for a given wattage. If the still rarer gas xenon was available in quantity then a further gain could be produced with a xenon-filled incandescent lamp, but at the present time the price of this gas is prohibitive for such usage.

Electric Discharge Lamp

The power of emitting radiation when suitably excited is one of the most fundamental and characteristic properties of an atom. The discovery and identification of many elements has depended upon or been assisted by this phenomenon. Indeed, it is probably true that no other property has contributed so much to our present state of knowledge of the structure of matter and of the elements of which it is composed.

Quite apart, however, from these analytical aspects the facility with which radiant energy can be produced under the influence of an electrical discharge is being turned to ever-increasing usefulness in modern discharge lamps and electron tubes. In lamps of the low-pressure type in which the discharge appears to fill the tubular vitreous envelope the electrodes generally terminate quite close to the ends of the tube. On the other hand, especially in some of the very high pressure mercury-vapour lamps, the discharge occupies only a very small proportion of the volume of the containing vessel and generally takes place at the approximate centre of a spherical bulb.

The geometry of the lamp is determined by the desired electrical and luminous characteristics. In practically any shape or size of bulb some luminous effects would be produced by an electric discharge through a gas or metallic vapour, but in general the efficiency would be very low and the lamp performance poor. Only by the most careful study of the peculiar requirements of each type of discharge has the present range of highly efficient lamps been evolved. For example, one class of mercury-vapour lamp operates inside an exhausted outer jacket to assist in the development and maintenance of the required mercury pressure, while another type of lamp must be operated in a stream of running water.

In all modern metallic-vapour lamps a low pressure of inert gas is introduced into the bulb after it has been exhausted and processed to facilitate ignition of the discharge and for other purposes. This inert gas filling, generally introduced at a pressure of only a few millimetres of mercury, is of course in addition to the metallic filling, which may be sodium or pure mercury or an alloy of mercury with cadmium or zinc, according to the class of lamp. For special-purpose lamps elements other than those mentioned may be introduced either to provide the principal gas or vapour or as additives to the primary radiating element.

The first phase in the development of the modern electric discharge lamp, which is designed in most cases for operation from alternating current mains and with a choke-stabilized arc, may be considered to have lasted not more than a decade. During that period, beginning in about the year 1930, the principal electric discharge lamps were of two main classes—mercury-vapour lamps operating at pressures of the order of one atmosphere with smaller lower-wattage lamps at higher pressures, and sodium lamps emitting light from the electrically excited resonating atom at comparatively low temperatures.

In the second phase of development several important new types of lamp have found practical applications, and their introduction has widened the field of research and stimulated activity in other directions. Practical forms of high-brightness projector-type lamps have been produced in wattages already as high as 15 kW. and with arc-brightness values greater than that of the carbon arc. The 1939–45 war gave impetus to work on flash discharge lamps, and a number of standardized types are now available. The favourable properties of the high-current density discharge through certain rare gases stimulated development work, which led to the evolution of a new type of discharge lamp—the gas arc. An electrically excited gas or metallic vapour usually

radiates only at certain definite wavelengths characteristic of its nature. According to the conditions of operation the radiant energy may be emitted at relatively few wavelengths or the emission may extend over a wide waveband and may be manifested as a complex assemblage of spectral lines.

Role of the Atom

To assist in understanding the way in which radiation is produced from the electrically excited atom we may visualize some mental picture such as that of the Rutherford–Bohr conception, in which the atom is likened to a miniature solar system. The nucleus of the atom, though occupying only a very small proportion of the volume, is responsible for practically the whole of the mass and consists in most cases both of protons and of neutrons. In the neutral atom, around the nucleus and arranged in certain orbits of movement, are electrons equal in total number to the number of protons. In considering the mechanism of gaseous ionization and the means by which the atom transforms electrical into radiant energy we are concerned with the electrons exterior to the nucleus and not with the nucleus itself.

In a normal gas-discharge or metallic-vapour lamp the emitted radiation is the sum of contributions from innumerable atoms far enough apart from each other to behave as separate entities. Any particular atom at a given instant of time will probably be emitting radiation at a different wavelength from that being emitted by its nearest neighbour, but each quantum of radiation will occur at a wavelength characteristic of the atom.

The radiation which is ultimately perceived or measured results from the summation of a very large number of small contributions from the individually excited atoms which together emit the complete spark spectrum. The relative quantities of radiation at each wavelength will be proportional to the number of atoms undergoing the responsible transition at a given time. It will therefore be appreciated that the conditions of excitation will affect the likelihood of occurrence of particular transitions within the atom and therefore the relative intensity of the radiation at each of the dominant wavelengths. The number of atoms radiating simultaneously in any excited gas is, however, so tremendous that under any given set of conditions the composition of the radiation will be constant.

Turning now to the structure of the atom itself, it has been mentioned that radiation from the electrically excited atom is produced by electronic changes in the atom. The nature of these changes is here discussed in a little more detail. The definite orbits in which the electrons progress around the nucleus are among the most fundamental characteristics of the atom, and even when an electron is removed by the process called ionization the remaining electrons are not free to take up random positions relative to the nucleus. The outer or valence electrons, however, revolving in orbits most remote from the nucleus, can be disturbed by very high speed electrons and can therefore receive extra energy, enabling them to take up transitory positions more remote from the nucleus. An electron so affected will, however, remain at its new energy level for a period of time much less than one-millionth of a second, after which it returns to its former state and in so doing emits radiation. The magnitude of the pulse or quantum of radiation then produced will depend in part on the extent of the original jump—that is, on the energy level to which the particular electron was raised by the primary collision, and, as stated above, a number of possibilities can arise.

It has been found that a simple relationship exists between the wavelength of the emitted radiation and the voltage difference between the energy levels within the atom between which the valence electron will fall in each transition:

$$\text{Wavelength} = \frac{1.2336}{\text{Vd. microns}}$$

In resuming its normal position in the unexcited atom the electron may not return to the ground state in a single jump, but may do so in a series of two or more steps. Much of the longer-wavelength radiation from atoms such as mercury are due to these stepped returns as distinct from single jumps from the excited state to the non-excited or ground state. The only transitions which produce light in the visible region are those between two excited states, while all electron jumps from an excited state to the ground or normal level produce radiation outside the visible region.

It is interesting, therefore, to note that under certain conditions of excitation the mercury atom can produce visible light efficiently. These conditions must obviously be those in which the minimum number of transitions directly to the ground state occur and the maximum number of transitions between higher energy levels take place. This fact will perhaps be more apparent on studying the formula given above, when it will be seen that visible radiation between 4,000 A and 7,000 A is produced only by transitions involving energy levels separated by between 3 and 1.8 volts—quite a narrow region. As the resonance potential of mercury is 4.68 volts it is clear that the wavelength of the resultant radiation is well down in the ultra-violet region.

The Fluorescent Lamp

It is a well-established fact that low pressure or low concentration of ions in a gas discharge, and low current density, favour the production of resonance radiation, and that higher pressures and current densities favour the intermediate transitions from higher energy levels. Applying these facts to the case of mercury vapour we see that, if efficient production of ultra-violet radiation is the requirement, then the mercury-vapour pressure should be low, as should the current density.

This fact is ultilized in the design of the modern fluorescent lamp. By the use of a very low vapour pressure of mercury a high percentage of the input energy is emitted as 2,537 A radiation. This radiation can then be transformed into visible light by a coating of a suitable inorganic phosphor on the inner surface of the glass tubing containing the discharge. In this country the principal lamp-makers now use a calcium halo-phosphate, which can be made to yield visible light of either white or near-white colours according to the proposed usage of the lamp.

Mention has been made in various journals of the use of beryllium compounds in fluorescent lamps. It should be noted that zinc beryllium silicate is not used by the leading lamp manufacturers in this country. It is true, however, that potential dangers arising from this compound in the U.S.A. and elsewhere have been greatly exaggerated.

Another line of development in the last decade has resulted from increased interest in high-current-density discharges through the rare gases, particularly through

xenon. As a result of this work flash discharge tubes have been made available which will produce intense flashes of light of very short duration suitable, among other things, for the photography of the human eye. These tubes are energized from a condenser charged to a high voltage. They emit in addition to the complex line spectrum of xenon a large amount of continuous radiation similar to that from an incandescent body. A further development has been the production of a continuously burning gas arc in which xenon is electrically excited to a high level. In the xenon lamp of either the flash or the gas arc type the light is white and is produced at a comparatively high efficiency.

Conclusion

Modern light sources fall, therefore, into four principal groups, each of which has distinct characteristics: (1) Incandescent sources in which the light is emitted by virtue of the temperature of a heated body. (2) Metallic-vapour discharge lamps in which the electrical excitation of the metallic vapour by the electric discharge causes the emission of characteristic radiation from the metallic ion. (3) Fluorescent lamps in which the primary radiation is produced from the low-pressure mercury discharge, but in which its radiation is absorbed by inorganic fluorescent compounds which are caused to glow with visible light. (4) Gas discharge lamps in which one or other of the rare gases is excited by the passage of the electric discharge; in this case the discharge may be of very short duration as in the repeating flash tube, or it may be a continuous discharge of high current density as in the gas arc.

None of these different types of light sources seems to have characteristics which will eventually make it supersede the others. All have a particular contribution to make in the production of artificial light for the many varied purposes for which it is required.

HAEMOLYTIC DISEASE OF NEWBORN DUE TO IMMUNE ANTI-A AGGLUTININ

BY

A. ZOUTENDYK, M.R.C.S., L.R.C.P.

(From the South African Institute for Medical Research, Johannesburg)

AND

A. BROIDO, M.R.C.O.G.

Assistant Surgeon, Department of Obstetrics and Gynaecology, Johannesburg Hospital and University of Witwatersrand

The importance of ABO blood-group incompatibility as a cause of haemolytic disease of the newborn has given rise to considerable controversy during the past few years; some have even doubted the existence of the hazard. However, new tests for sensitization and refinements in technique have furnished ample evidence that such incompatibility does at times produce a definite clinical condition. There is also no doubt that ABO incompatibility between mother and foetus has a sparing effect on Rh response and reduces the risk of Rh sensitization where Rh incompatibility exists.

Pickles (1949), in reviewing the recorded cases, has emphasized that rigid criteria should be complied with before an alleged case of ABO sensitization is accepted as such, and has stressed the necessity for stringent tests to exclude all other abnormal antibodies, and for proof, by a positive direct Coombs reaction, of adsorption of the antibody on the affected baby's erythrocytes. Such criteria are now minimum requirements in specialist laboratories. Additional confirmatory tests include parallel titrations in saline and serum or albumin at different temperatures, especially 4° C. and 37° C. (Hubinont, 1949). Boorman *et al.* (1949) have also carried out differential agglutination tests of survival rates and have shown that cells of the type in question are eliminated abnormally rapidly. Mollison and Cutbush (1949) have reported similar results.

In our experience the condition is relatively common in Bantu races, in whom it is probably as important as Rh sensitization, as only 5% of the Bantu are Rh-negative and the incidence of classical Rh sensitization is correspondingly low; moreover, distribution of the Rh subgroup is very different from that in Europeans (Zoutendyk, 1947). Similar results among negroes in the United States have been reported by Wiener, and he has also described two cases treated by exchange transfusion (Wiener *et al.*, 1949).

The following case demonstrates the importance of ABO incompatibility and emphasizes that the obstetric history may, in fact, be worse than in the case of Rh incompatibility, as in the latter state the first pregnancy almost invariably ends successfully provided that the Rh-negative mother has never received Rh-positive blood even in minimal amounts by any route.

Case Report

The patient, aged 24, had been married for 18 months when her first pregnancy ended in an abortion at 14 weeks. Serological investigations were not made because at that time blood-grouping and Rh-testing were not routine procedures. However, complete investigations were carried out on the blood of the patient and her husband in December, 1948, when the second pregnancy had progressed to 14 weeks. The reactions were as follows:

	Group	Anti-C	Anti-D	Anti-E	Anti-c	Anti-M	Anti-N	Blood Type
Patient ..	O	+	+	−	+	−	+	O CcDe N
Husband	A_1	+	+	−	+	−	+	A_1 CcDe N

It will be seen that, apart from the difference in the ABO grouping, the reactions are identical. No abnormal saline or albumin agglutinins were demonstrable in the wife's serum against a wide range of Group O test cells both of known type and of others taken at random, and the indirect Coombs test was negative in every instance. The anti-A titre, however, as ascertained against the husband's red cells, was 1/10,000 at 37° C. The anti-B titre was 1/50, which is normal.

The abnormally high anti-A titre at 37° C. was considered to be of obstetric significance, and systematic investigations and titrations were tentatively planned for 32, 36, and 38 weeks. Unfortunately the patient went into labour at 31 weeks and, although the foetal heart had been heard 24 hours previously, a stillbirth resulted. Investigations on the cord blood showed that the baby belonged to Group A_1, but in other respects the reactions were the same as those of the mother. The maternal serum agglutinated the baby's cells to a titre of 1/20,000 in saline and 1/50,000 in serum. The anti-B titre remained unchanged at 1/50. The baby's red cells gave a strongly positive direct Coombs reaction. Exhaustive tests of the maternal serum on a representative panel of Group O cells in saline, serum, and albumin and by the indirect Coombs method failed to reveal irregular antibodies.

We considered the evidence conclusive enough to ascribe the foetal death to an immune anti-A agglutinin of abnormally high titre. As the prognosis depended on whether the husband was homozygous or heterozygous for A, family studies were carried out in the hope that information might be obtained on this point, but they failed to be of assistance, as both his parents belonged to Group A.

Follow-up investigations were carried out six months later, when it was found that the anti-A titre had fallen to 1/1,000. In November, 1949, the patient became pregnant for the third time. Systematic investigations and titrations were carried out throughout the pregnancy. The anti-A titre fell progressively to 1/500 and subsequently remained unchanged at this level. The anti-B titre was constant at 1/50. As the pregnancy progressed and no change occurred in the titre we felt increasingly confident that a Group O foetus was present, and we decided to allow the pregnancy to proceed to term. On September 7, 1950, the patient went into labour and was duly delivered of a normal female infant. Immediate investigations on the cord blood showed that the baby did indeed belong to Group O, and the direct Coombs test was negative. The haemoglobin was 19 g.%, nucleated red cells were not observed, and the blood picture was normal in all respects. The maternal serum had no abnormal action on the baby's cells in saline or albumin, and the indirect Coombs test was negative.

The husband was thus proved to be heterozygous AO, and there will be an even chance of a Group O and consequently unaffected baby resulting in any further pregnancy. Should a rising anti-A titre again indicate the presence of a Group A foetus one would recommend premature induction of labour followed by immediate blood investigations and, if indicated, immediate transfusion of the baby with Group O blood, selected before delivery as not being acted upon abnormally by the mother's serum.

Summary

A case history is given in which the importance of an immune anti-A agglutinin of abnormally high titre is illustrated. The sequence was an abortion possibly due to this agglutinin, a stillbirth certainly caused by it, and finally the birth of a normal baby belonging to Group O.

It is emphasized that ABO incompatibility is a relatively important cause of haemolytic disease, and every case with a suspicious obstetric history should be fully investigated from this point of view.

REFERENCES

Boorman, K. E., Dodd, B. E., and Trinick, R. H. (1949). *Lancet*, 1, 1088.
Hubinont, P. O. (1949). *British Medical Journal*, 2, 574.
Mollison, P. L., and Cutbush, M. (1949). *Lancet*, 2, 173.
Pickles, M. M. (1949). *Haemolytic Disease of the Newborn*. Blackwell, Oxford.
Wiener, A. S., Wexler, I. B., and Hurst, J. G. (1949). *Blood*, 4, 1014.
Zoutendyk, A. (1947). *S. Afr. J. med. Sci.*, 12, 167.

The Ministry of Health announces that clean-food drives throughout the country will be aided by a new display set on the dangers of food-poisoning. Photographs and coloured sketches show how easily food becomes infected through dirty and careless handling. Unwashed hands are highlighted as the principal source of infection, and there are warnings against germs spread by unguarded coughs and sneezes, by unprotected cuts and sores, and by flies, rats, and mice. Other panels record the case history of a victim of food-poisoning and give commonsensé preventive measures, including hints on cooking and washing-up. This latest 12-panel display set is the fifth in the comprehensive series on hygiene being produced by the Ministry with the help of the Central Office of Information for the use of hospitals, factories, local authorities, and voluntary organizations.

CHANGES IN SWEATING AFTER PRICKLY HEAT

BY

W. S. S. LADELL, M.B.

(From the Colonial Medical Research Committee's Laboratory for Hot Climate Physiology, Oshodi, near Lagos, Nigeria)

In 1944 Ladell, Waterlow, and Hudson described a type of heat exhaustion characterized by diminished sweating, poor heat tolerance, inability to retain water and salt, and a general lassitude, increasing as the day got hotter; the anhidrosis was often associated with healed prickly heat. There was also, especially in cases with a history of severe prickly heat, an unusually high concentration of chloride in the sweat of these patients when tested during convalescence. A similar syndrome of anhidrosis and asthenia was described by Wolkin, Goodman, and Kelley (1944), who did not record any association with prickly heat; but O'Brien (1947), working in South-east Asia, confirmed clinically the anhidrotic effect of prickly heat and the subsequent development of tropical asthenia.

It has not previously been possible to confirm experimentally the effect of prickly heat on sweating and on the composition of sweat, as the lesion cannot be produced in the laboratory, and it is usually endemic in localities where facilities for detailed investigations are non-existent. Even when facilities do exist it is not practicable to test all new arrivals in the country in the hope that some of them will develop severe prickly heat later and present themselves for reinvestigation. Observations on a single case are therefore presented as a clinical record with details that are unlikely to be obtained often.

Case Report

A man arrived in the Tropics for the first time to join the staff of this unit in September, 1950. In October, 1950, he was given a routine acclimatization test, consisting of five 20-minute cycles of work and rest, mean metabolic cost 100 kg.cal./m.²/h. (=2 met) in a climate of 100° F. (37.8° C.) dry bulb, 93.5° F. (34.2° C.) wet bulb, air movement 50 ft. (17 m.) a minute. Pulse rates, rectal temperatures, and body weights were recorded every 10 minutes throughout the 110-minute exposure; serial samples of sweat were obtained by an arm bag and analysed for chloride; water drunk and urine passed were measured. After the test the subject was an active observer in a series of climatic investigations, in which effective temperatures up to 95° F. (35° C.) were used, three days a week.

Within a few weeks, and shortly after being severely sunburnt when playing cricket, he developed prickly heat. The skin over the back, forearms, wrists, and belly was most affected; the irritation kept him awake at night and he began to complain of lassitude and debility. The condition was exacerbated by exposure to climates in which, although he sweated freely, evaporation was rapid enough to leave the skin sticky rather than wet; profuse sweating, with perspiration running off the skin, tended to give relief. He continued his work in the climatic chamber while treating his prickly heat vigorously. He gave up wearing tight-fitting cotton singlets, which became sweat-sodden and irritated the skin, and he cut down the use of soap; he applied a lotion of salicylic acid and perchloride of mercury in spirit (30%) to the affected parts every few hours, on the basis of E. C. Smith's (1927) demonstration that prickly heat is a monilia infection, and he anointed himself with red palm oil after bathing, in accordance with O'Brien's observation that the disorder is aggravated by, if not the result of, a deficiency of

fat on the skin. One month later the skin was clear except for a few small patches on the wrists and back; he was sleeping well again and no longer complained of lassitude.

Reactions to Heat After Recovery

In March, after he had been going into the climatic chamber three or more times a week for 20 weeks, he was again tested to determine to what extent he had become acclimatized. Changes the reverse of acclimatization were, however, found. In Fig. 1 are plotted the mean sweat rates and mean rectal temperatures for successive ten-minute periods in each of the two tests. For the first 40 minutes of the second test he showed evidence of acclimatization (MacArdle, 1944); he began sweating at a lower rectal temperature and sweated more at a given rectal temperature. But as the exposure continued and his rectal temperature went higher his sweat rate failed to increase further. The final rectal temperature was 0.5° F. higher in the second exposure, but the sweat rate never surpassed that achieved during his first exposure, when he could not have been acclimatized. The overall sweat production in the first exposure was 1,950 g. for a rectal temperature rise of 2.7° F. (1.5° C.); the corresponding figures for the second exposure were 1,765 g. and 3.9° F. (2.2° C.). The ratio (sweat-output/rectal-temperature rise) over a standard 80-minute period suggested as an index of acclimatization (Ladell, 1951), fell from 668 on the first to 497 on the second exposure. A second, fully acclimatized, subject tested as a control in the chamber on the same two occasions had a ratio of 781 on the first and 776 on the second test.

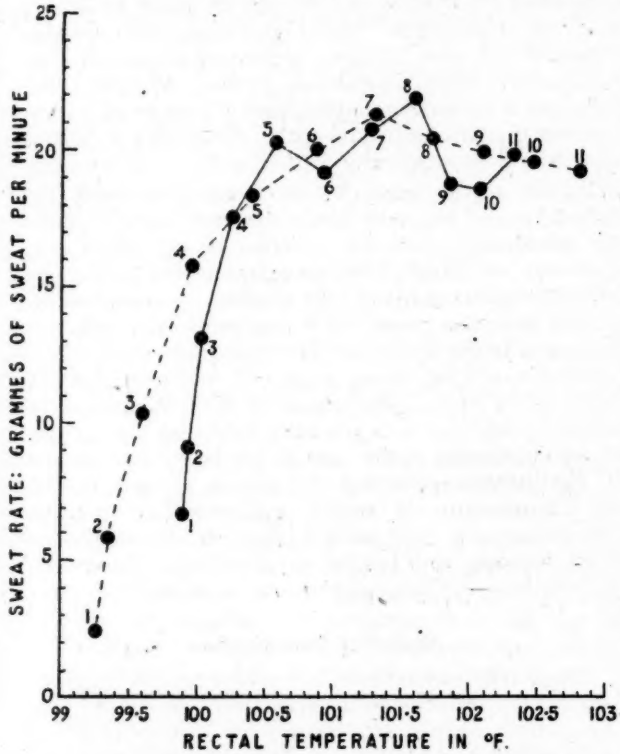


FIG. 1.—Sweat-rate/rectal-temperature curves before and after prickly heat. The mean sweat rates and rectal temperatures in the successive 10-minute periods are shown as solid circles, with the number of the period. Continuous line = before prickly heat; broken line = after prickly heat.

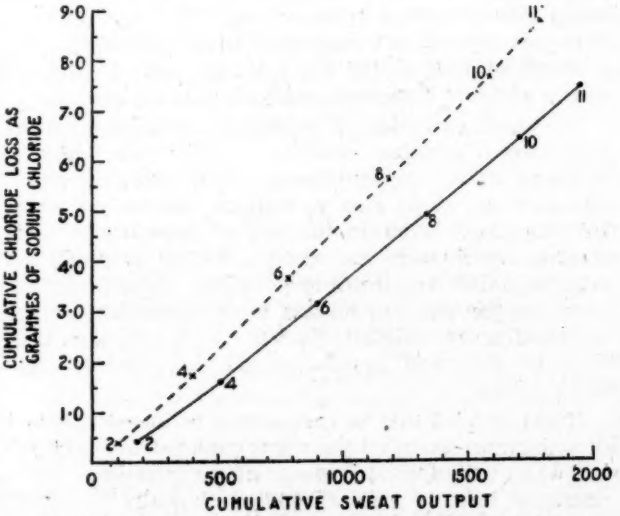


FIG. 2.—Salt losses in the sweat before and after prickly heat. Cumulative salt loses have been plotted against cumulative water losses at 20-minute intervals throughout each exposure. The small numbers beside the points correspond with the numbers outside the circles in Fig. 1. Continuous line = before prickly heat; broken line = after prickly heat.

Fig. 2 shows the cumulative salt losses in the sweat for each of the two exposures, plotted against the cumulative sweat water loss, at the end of each 20 minutes. Salt losses were markedly higher in the second exposure: for a sweat loss of 1,800 g. the subject lost 6.85 g. of sodium chloride on his first exposure, but for the same sweat loss on the second exposure he lost 8.85 g.; the mean concentration of chloride in the sweat had increased from 0.38% to 0.49%, expressed as sodium chloride.

Discussion

With acclimatization the sweat rate increases, the body temperature does not rise so high, and (Conn, Johnston and Louis, 1946; Robinson, 1949) the chloride content of the sweat falls. The subject, however, after nearly five months' work in a tropical climate, which would have tended to acclimatize him but during which he had had severe prickly heat, showed the reverse of these changes. To what extent could this reversal be regarded as the effect of the prickly heat, on the hypothesis of Ladell, Waterlow, and Hudson (1944)? Other factors might have contributed. Thus Thomson (1951) has shown that ultra-violet irradiation will diminish the sweat rate. The subject here was, however, first tested soon after being badly sunburned in the cricket field, and, though he continued to play cricket, the amount of body surface exposed while playing was not extensive.

The small vesicles, the sudamina, described by Thomson, were exhibited by the subject; but these are usual in prickly heat (O'Brien, 1947); the vesicles are the mechanical result of blockage of the mouths of the sweat glands. The treatment with mercury perchloride may itself have been injurious to the sweat glands and so have been a contributory cause to their altered activity. Possibly all three factors were concerned—prickly heat, sunburn, and the mercury.

In spite of the opportunity for acclimatization, the subject lost more instead of less salt in his sweat; this could have been the result of an increased salt intake (Ladell, 1945a), though he did not confess to one. Such an increase, according to Horne and Mole (1949) would itself have precipitated prickly heat; on the other hand, clinical experience in West Africa (Egerton, 1950) suggests that increasing the salt intake relieves rather than exacerbates this skin lesion. It is probably more reasonable to suppose the change in the sweat to be secondary either to the prickly heat itself or to some coincident systemic disorder. The actual validity of the estimation of salt loss in the sweat by arm samples has been questioned by Van Heyningen and Weiner (1950), but the method has been fully investigated and found accurate under the conditions of these tests (Ladell, 1948a).

The increased rise in the rectal temperature could not be attributed to the diminished sweating, as there was always more sweat produced than could be evaporated, and in Thomson's experiments considerably greater reduction of sweat, after ultra-violet irradiation, did not affect heat tolerance. A systemic disorder must therefore be postulated, which would also account for the lassitude and debility. The subject was, in fact, a mild but typical case of Ladell, Waterlow, and Hudson's Type II heat exhaustion. To adopt Selye's (1950) terminology, Type II exhaustion might be called, as a working hypothesis, a "disease of adaptation." To some extent this concept is supported by accumulating evidence that the adrenal cortex may be involved in the control of sweating (Ladell, 1945b; Conn and Louis, 1950); on this theory, prickly heat would be the stress which, added to the several already imposed by a tropical climate, would rapidly lead to what Selye calls the "exhaustion stage," so that even after apparent recovery the heat tolerance remains markedly diminished. A somewhat similar hypothesis has been advanced elsewhere (Ladell, 1948b), but positive evidence for it has not yet been obtained.

Summary

An otherwise healthy subject on recovery from prickly heat showed a diminished tolerance to heat and an increased rate of chloride loss in the sweat, as compared with his figures obtained before prickly heat developed. The implications of these findings are discussed in relation to a certain type of heat exhaustion.

I wish to thank the Director of Medical Services, Nigeria, for his permission to publish this report.

REFERENCES

Conn, J. W., Johnston, M. W., and Louis, L. H. (1946). *Fed. Proc.*, **5**, 230.
—— and Louis, L. H. (1950). *J. clin. Endocrinol.*, **10**, 12.
Egerton, M. E. (1950). *British Medical Journal*, **2**, 1292.
Horne, G. O., and Mole, R. H. (1949). *Lancet*, **2**, 279.
Ladell, W. S. S. (1945a). *Brit. med. Bull.*, **3**, 175.
—— (1945b). *J. Physiol.*, **104**, 13P.
—— (1948a). Ibid., **107**, 465.
—— (1948b). *Proc. Fourth. Int. Congr. Trop. Med. and Malaria*, **1**, 165. Dept. of State, Washington.
—— (1951). In preparation.
—— Waterlow, J. C., and Hudson, M. F. (1944). *Lancet*, **2**, 491, 527.
MacArdle, B. (1944). Quoted by Ladell (1945a).
O'Brien, J. P. (1947). *Brit. J. Derm. Syph.*, **59**, 125.
Robinson, S. (1949). In *Physiology of Heat Regulation*, edited by L. H. Newburgh, p. 193. Saunders, Philadelphia.
Selye, H. (1950). *British Medical Journal*, **1**, 1383.
Smith, E. C. (1927). *Trans. roy. Soc. trop. Med. Hyg.*, **20**, 344.
Thomson, M. L. (1951). *J. Physiol.*, **112**, 22.
Van Heyningen, R., and Weiner, J. S. (1950). Ibid., **112**, 13P.
Wolkin, J., Goodman, J., and Kelley, W. E. (1944). *J. Amer. med. Ass.*, **124**, 478.

One of the main aims of treatment at the Cassel Hospital for Functional Nervous Disorders is to prevent desocialization and accustom the patients to community life and responsibilities (*Medical Director's Report, 1948–50*). The team of workers mainly concerned with this aspect of treatment is called a social therapy unit, and is composed of nurses, two psychiatric social workers, and a psychologist. They are responsible for everything except the actual psychoanalysis. A great deal of emphasis is placed on the patients' social life while in hospital, and patients' committees are made responsible for their welfare, entertainment, and other activities. Subcommittees deal with messing, and regularly meet the hospital staff concerned; the housing committee allocates bedrooms, and this method greatly avoids displays of neurotic behaviour. Patients who are fit to do so clean and look after their own rooms, and some are attached to the housekeeper to help with her duties, or assist the administrative, clerical, and maintenance staff.

ACTINOMYCOSIS IN THE NORTH-EAST OF SCOTLAND

BY

I. A. PORTER, M.B., Ch.B.

Assistant, Department of Bacteriology, University of Aberdeen

Although clinical accounts of actinomycosis in man had been given by Ponfick in 1882 and by Israel in 1886, it was not until some years later that the causative organism of the disease, *Actinomyces israeli*, was isolated by Wolff and Israel (1891). Wright (1905) obtained a similar organism from 13 cases of actinomycosis in man and two in cattle. Since then these findings have been repeatedly confirmed by other workers.

Within recent years it has been recognized that actinomycosis, although not a common disease, cannot be considered rare. In a period of six weeks from February to March, 1949, three specimens of pus containing sulphur granules and showing on microscopical examination the branched filaments of *A. israeli* were examined in the University Department of Bacteriology, Aberdeen. That three cases of actinomycosis had occurred in such a short space of time was considered unusual, although it is generally held that the infection is not uncommon in this area of Scotland. Examination of the literature revealed few reports of the incidence of actinomycosis in Britain and none for Scotland. Accordingly, it was decided that an investigation of actinomycosis, with special reference to its incidence in the north-east of Scotland, would be of interest.

Scope of Investigation

The survey was restricted to actinomycosis which had occurred in residents in the counties of Aberdeen, Banff, Kincardine, Moray, and Nairn from 1936 to 1948. To ensure that the list was as complete as possible the records of admission to the hospitals in the area and the bacteriological and pathological records of the Aberdeen Royal Infirmary and the City Hospital were examined. The records of cases of actinomycosis which had been treated in the *X*-ray Therapy Department, Aberdeen Royal Infirmary, were also examined. The period 1936–1948 was chosen, as it was considered desirable to use a period of time in the fairly recent past in order to ensure accurate diagnosis and follow-up of cases.

The north-east area of Scotland, on account of its geographical position, contains a population which is relatively static. At the census of 1931 the total population of the whole area was about 444,000, of which 167,000 people lived in the city of Aberdeen. The chief occupations in the city are fishing, shipbuilding, and the granite and distributive trades. The provincial towns in the area are market towns dependent on the surrounding agricultural districts. The chief occupations of the rural population are dairy-farming and stock-raising.

It was decided that no case should be included as one of actinomycosis unless there was confirmatory bacteriological or pathological evidence of the infection. As a result, at least 10 cases diagnosed clinically as actinomycosis have been excluded. The minimum requirements for bacteriological confirmation were the finding of sulphur granules and the demonstration microscopically of the branched filamentous organism. The finding of

club-bearing filaments in sections of the tissues was required before pathological confirmation could be claimed.

Results

In the thirteen years over which the investigation extended 98 cases of actinomycosis occurred amongst the population of this region. Each of these satisfied the requirements of laboratory confirmation stated above, although in seven of them there were few or no details of the clinical manifestations of the disease. Table I shows the results obtained in some previous surveys in America and Britain; the results of the present investigation have been included for comparison. The figures given by Sanford and Magath (1921), of the Mayo Clinic, are comparable in size to those from the north-east of Scotland. But, whereas the latter came from a well-defined area with a known population, those of Sanford and Magath were collected from all over the United States and Canada. Of the 46 cases reported by Davis (1941) from the University Hospital, Nashville, Tennessee, it would appear that 14 were unconfirmed by laboratory examination.

TABLE I.—*Results in Some Previous Surveys*

Investigation	No. of Cases	No. of Years	Mean Annual Incidence
America:			
Sanford and Magath (Mayo Clinic) (1921)	96	13	7·4
Davis (1941)	46 (32)	10	4·6 (3·2)
Britain:			
Acland (1906)	109	23	4·7
Foulerton (1913)	78	13	6·0
Cope (1930) (11 hospitals) ..	167	97	1·7
N.E. Scotland (1950):			
Present survey	98	13	7·5

The case numbers in parentheses refer to those confirmed by laboratory examination.

The 167 cases collected by Cope (1930), and discussed at a meeting of the Royal Society of Medicine, came from eleven hospitals in England over periods totalling 97 years, giving an annual mean incidence of 1.7. This low annual mean incidence is accounted for by the fact that the 167 cases were all hospital cases, no out-patients being included in this total. At the same time Cope gave the number of cases which had occurred in two large Scottish hospitals—the Glasgow Royal Infirmary and the Edinburgh Royal Infirmary—five cases in ten years and eight cases in nine years respectively. In the light of these figures from Scotland the 98 cases obtained from the area here under consideration is a surprisingly large number.

The distribution of cases of actinomycosis over the years of the survey is fairly uniform except for 16 and 12 cases in the two "peak" years 1941 and 1943 (Table II). The increase in these years may be explained, at least partially, by the inclusion in each of five cases of actinomycosis which had occurred in members of the armed Forces stationed in the area.

TABLE II.—*Number of Cases in Each Year*

Year	No. of Cases		Year	No. of Cases	
	Male	Female		Male	Female
1936 ..	5	1	1943 ..	9	3
1937 ..	3	3	1944 ..	4	1
1938 ..	4	1	1945 ..	4	1
1939 ..	5	—	1946 ..	3	4
1940 ..	6	2	1947 ..	4	5
1941 ..	12	4	1948 ..	7	2
1942 ..	2	3			
			Total ..	68	30

Sex and Age Incidence

It is characteristic of this disease that males are much more often affected than females, the ratio of male to female cases being roughly two to one. This is borne out in the present series, 69% of the cases being in males (Table III).

TABLE III.—*Percentage of Males Affected*

Investigation	No. of Cases	% of Males
Acland	101	65
Foulerton	78	65·4
Sanford and Magath (Mayo Clinic) ..	96	84
Sanford and Magath (U.S.A.) ..	119	66
N.E. Scotland	98	69

The age of the youngest patient was 2 years and that of the oldest 80 years. The distribution in the various age groups is shown in the Chart. The maximum number occurred in the 21–30 age group or, to extend the period further, in the 11–30 age group, which included 53 out of the 97 cases. Cope (1930) asked if the rise in incidence over the age of 5 years was parallel to the increasing incidence of dental caries. It is difficult to obtain figures of the incidence of dental caries,

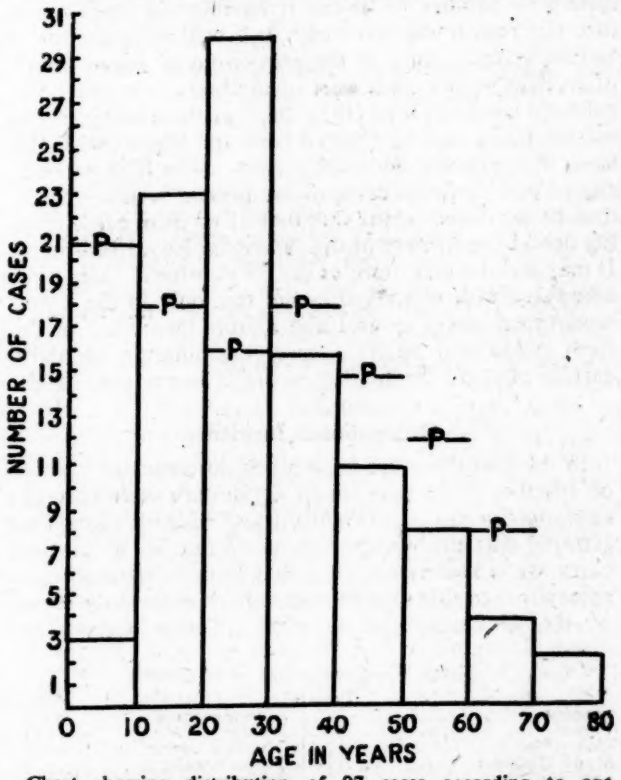


Chart showing distribution of 97 cases according to age groups. The percentage of the population in each age group (based on civilian population) is marked —P—.

but it is commonly held that the maximum occurs between 15 and 30 years. Over the age of 30 the "denture era" is reached.

In the 1–10 group the number of cases is small in comparison with the size of the population in this age group. In the 11–20 and 21–30 groups more cases have occurred than would have been expected from the proportion of the population in these groups. After the age of 30 the fall in the number of cases is parallel to the fall in

the number of the population. However, these 97 cases include 11 which had occurred in members of the armed Forces, while the percentage population figures are for the civilian population only. These 11 cases were distributed in the various age groups as follows: under 20, 1 case; 21 to 30, 6 cases; 31 to 40, 3 cases; 41 to 50, 1 case. If the seven cases in members of the armed Forces in the group up to 30 are deducted it will be seen that more cases still occur in this age period than would be expected from the size of the population.

Anatomical Distribution

The anatomical distribution of the disease is known in 95 cases (Table IV). In 72 (75%) the lesions were

TABLE IV.—*Anatomical Distribution in 95 Cases*

	Cases
Cervico-facial actinomycosis	72
Abdominal ,,	14
Thoracic ,,	1
Actinomycosis of breast	1
,, ,, C.N.S.	1
,, ,, thorax and skin	1
,, ,, ,, ,, neck	2
,, ,, ,, ,, abdomen	1
,, ,, neck and skin	1
,, ,, face and C.N.S.	1

confined to the cervico-facial region, in 14 to the abdomen, and one was intrathoracic. The breast alone was affected in one instance and the central nervous system in another. In the remaining six cases more than one region was involved. It is well recognized that actinomycosis occurs in the cervico-facial region more often than in any other part of the body. In the 1,330 collected cases of Cope (1938) 56% of them involved the cervico-facial region, while of New and Figi's (1923) 167 cases 68% affected the same region. The high percentage of cervico-facial cases in the present series—75%—may be explained by the fact that 31 of them came from the dental department of the Aberdeen Royal Infirmary. It may well be that more of the cervico-facial cases were associated with dental caries but that only in the dental department was a careful and minute inspection of the teeth made and bacteriological examination regularly carried out and the finding recorded in the case-sheet.

Occupational Incidence

In the past there has been much difference of opinion on whether those engaged in agriculture were specially liable to this disease. Sanford and Magath found that farming was the occupation of 57 out of 90 of their cases, while Davis concluded that farmers were no more susceptible to this disease than others, since only 15 out of his 46 cases were farmers. Table V gives the

TABLE V.—*Occupations of 91 Cases*

	Cases		Cases
Farming	20	Marine engineer	1
Forces	11	Painter	1
Housewives	15	Munition worker	1
School-children	15	School teacher	1
Labourers	5	Brickworker	1
Chauffeurs	2	Tramdriver	1
Factory workers	2	Fish worker	1
Motor mechanic	1	Postman	1
Railway porter	1	Retired	2
,, fireman	1	Agricultural student	1
Van boy	1	Domestic servant	1
Blacksmith	1	Milk delivery girl	1
Draper	1	Pre-school child	1
Salesman	1		

occupations at the onset of the disease of 91 of our cases; it will be seen that 20 occurred in farmers—all males. As they came from a restricted area with a stable population it was possible to obtain the figures of the number of males engaged in farming and the number of males engaged in non-agricultural occupations; it appeared worth while to submit the figures to statistical analysis, for which I am indebted to Mr. Quenioulle, statistician, Marischal College, Aberdeen. The results show that the attack rate among farmers was 1 in 250 and in the remainder of the male population 1 in 2,900, the difference between these rates indicating that males engaged in farming are more liable to develop this disease than those in non-agricultural occupations.

Eleven cases of actinomycosis occurred in members of the armed Forces in this area. Ten of these occurred in men who were strangers to this part of Scotland. It may be that there is a greater liability to develop this infection here, or it may be that the conditions under which the troops were living played a part in the production of the disease.

Influence of Trauma

It has been recognized that trauma often precedes the onset of this infection. In the present series of 72 cervico-facial cases it was found that in three there was a history of injury to the mouth or face and that in 12 there had been extraction of one or more teeth a short time before the onset of the disease. In five cases the patient had suffered from tonsillitis a few days to a few weeks before actinomycosis developed, and in 23 other cases the disease was associated with gross dental caries. In 11 of the 14 abdominal cases there had been an antecedent appendicectomy. One of the remaining three patients in this group gave the history of a fall on his right flank. The skin was unbroken, but over a period of ten days a swelling developed in the right lumbar region, from the contents of which, after incision, a pure culture of *A. israeli* was obtained.

Mortality

The number of deaths from actinomycosis in this area from 1936 to 1948 recorded by the Registrar-General for Scotland was 12, while eight deaths occurred in this series of 98 cases. It was found that seven deaths were common to both lists. The five extra cases which appeared in the list of the Registrar-General could not be included here, for the following reasons: (*a*) one had its origin outside the area; (*b*) three occurred at home and the patients do not appear ever to have been in hospital, so no evidence was available to show that the diagnosis had been confirmed by laboratory examination; (*c*) one case, although certified as actinomycosis, was found at post-mortem examination to be a carcinoma of the caecum.

The one further death which occurred among the 98 cases reported here and which escaped registration as actinomycosis by the Registrar-General had been diagnosed clinically as meningitis and the cause of death certified as such. However, on post-mortem examination the condition was found to be an actinomycotic meningitis. No death occurred in any case in which the infection was limited to the cervico-facial region. Five deaths occurred amongst the abdominal cases and one death in each of the following: skin and thorax, cervico-facial and skin outside this area, and cervico-facial with central nervous system involvement.

Discussion

Although actinomycetes are commonly found in the soil, these are, unlike *A. israeli*, all aerobes. Bostroem

in 1890 claimed that he had isolated an aerobic actinomycete from cases of the disease in cattle; later workers showed that he almost certainly was dealing with a non-pathogenic organism. Infections due to aerobic actinomycetes are known, but in most cases of actinomycosis the micro-aerophilic or anaerobic *A. israeli* can be isolated. This latter organism has never been found free in nature. In addition to its isolation from lesions of the disease it has been obtained by numerous workers from the mouths, carious teeth, gums, and crypts of the tonsils of healthy individuals (Lord, 1933; Emmons, 1936; Slack, 1942). The oral cavity is considered to be the normal habitat of this organism. When certain abnormal conditions arise in the mouth *A. israeli* is thought to alter its habit from a saprophytic to a parasitic state and invade the tissues, giving rise to actinomycosis. It would appear that trauma—for example, the extraction of a tooth—is one factor in precipitating this infection. That there must be others is apparent.

The fact that pieces of grain or grass were often found in actinomycotic lesions was thought to support the theory of Bostroem that the causal organism was aerobic and came from the soil. It is now believed that such foreign bodies act only in their traumatic capacity and allow the *A. israeli*, already in the mouth, to gain access to the tissues.

According to the series of cases presented here there is no doubt that agricultural workers are more often affected than others by actinomycosis. Previous surveys amply support this finding. There is no obvious explanation for this, but an occupational hazard is indicated. The city dweller is not immune from the disease, and it may well be that during a visit to the country or while working in his garden he is exposed to some factor which predisposes to this infection.

Summary

In a restricted area in the north-east of Scotland there occurred 98 cases of actinomycosis in the 13 years from 1936 to 1948. All these cases were confirmed by laboratory examination.

The results suggest that the incidence of actinomycosis is relatively high in this area.

The 98 cases are analysed with particular reference to the age groups affected, sex difference, anatomical distribution, and occupation. The findings are in agreement with previous investigations. The fact that agricultural workers appear to be specially liable to this disease is stressed.

Eight deaths occurred in this series, but there was no death where the infection was limited to the cervico-facial region.

I wish to thank Professor John Cruickshank for his encouragement, and the records staff of the various hospitals for their assistance in obtaining the necessary data.

REFERENCES

Acland (1906). Quoted by Foulerton (1913).
Bostroem, E. (1890). *Beitr. path. Anat.*, **9**, 1.
Cope, V. Z. (1930). *Proc. roy. Soc. Med.*, **23**, 866.
—— (1938). *Actinomycosis*. Oxford Univ. Press, London.
Davis, M. I. J. (1941). *Amer. J. Surg.*, **52**, 447.
Emmons, C. W. (1936). *Bull. Hyg., Lond.*, **11**, 919.
Foulerton, A. G. R. (1913). *Lancet*, **1**, 381.
Israel, J. (1886). In *Recent Essays on Bacteria*, p. 463. New Sydenham Society, London.
Lord, F. T. (1933). *Med. Clin. N. Amer.*, **16**, 829.
New, G. B., and Figi, F. A. (1923). *Surg. Gynec. Obstet.*, **37**, 617.
Ponfick, E. (1882). *Die Actinomykose des Menschen*. Berlin.
Sanford, A. H., and Magath, T. B. (1921). *Coll. Pap. Mayo Clin.*, **13**, 1057.
Slack, J. (1942). *J. Bact.*, **43**, 193.
Wolff, M., and Israel, J. (1891). *Virchows Arch.*, **126**, 11.
Wright, J. H. (1905). *J. med. Res.*, **13**, 349.

POTASSIUM BROMATE POISONING

BY

WILLIAM A. PARKER, M.D., F.R.F.P.S.

AND

JOHNSTON R. BARR, M.B., Ch.B.

(From the Royal Infirmary, Stirling)

Potassium bromate poisoning has been recorded only twice in the literature. Carratala and Urcaray (1941) reported one case of grave intoxication, and Dunsky (1947) published a necropsy report on a 17-months-old boy who died after swallowing an unknown quantity of potassium bromate from a neutralizer contained in a "home-perm" outfit. The following case report is presented because similar cases could be expected in view of a claim by manufacturers of home-perm outfits that more than fifty million outfits are sold annually in the United States of America alone. MacKenna (1950a, 1950b) gave a timely outline of treatment.

Case Report

A boy aged 3 found a milk-bottle containing a clear fluid and drank a quarter of its contents. The bottle contained ½ oz. (14.2 g.) of potassium bromate dissolved in one pint (570 ml.) of water, being the neutralizing solution of a home-perm outfit. The child was well until one hour later, when he complained of nausea and vomited. During the next hour he vomited several times and began to look pale. He was given ½ oz. of castor oil, which he vomited immediately, but within half an hour he passed two fluid stools and had much abdominal discomfort. Retching started, and he had a small haematemesis estimated at about half a cupful. It was four hours after swallowing the potassium bromate before medical aid was sought, and he was admitted to hospital two hours later.

On admission the child, a well-developed boy, was unconscious, pale, and flaccid. He could not be roused, but occasionally moved a limb. The pupils reacted to light. Tendon reflexes were absent and the plantar responses were equivocal. The abdomen was soft on palpation. The pulse rate was 100 a minute, regular, but of poor volume; the blood pressure was 85/45 mm. Hg; the heart was not enlarged. Eyeball tension was diminished; the tongue was dry but the skin moist. The axillary temperature was 97° F. (36.1° C.). Respirations were shallow at 30 a minute, and there was acetone in the breath. The fundi were normal.

Gastric lavage was carried out immediately with warm normal saline, and 10 oz. (284 ml.) was left in the stomach. Dextrose 5% in normal saline was given by intravenous drip and warmth applied. After the pulse rate had increased during the next two hours to 160 the intravenous drip was discontinued when 30 oz. (850 ml.) had been given. The axillary temperature and eyeball tension were now normal. Respirations, however, were shallow and rapid, so 1 ml. of nikethamide was given intramuscularly. Soon afterwards the blood pressure rose to 110/65 and the tendon reflexes were elicited. Consciousness was regained three hours after admission.

During the next three days intermittent vomiting continued, but considerable quantities of glucose drinks and warm citrated milk were retained. The child was irritable and pale, and lay with eyes open but remained motionless most of the time. Tachycardia at the rate of 120 a minute remained until the twelfth day after admission. Anuria was present for the first 24 hours, and only a few millilitres were passed on the second day. On the third day 6 oz. (170 ml.) was passed, and subsequently quantities were normal. Albuminuria, at first 6 g. per litre, diminished, but did not disappear until the seventh day. No casts or other

abnormal constituents were present except acetone on the second day.

On the seventh day after admission the child smiled, took an active interest in his surroundings, and accepted a semi-solid diet. Convalescence was uneventful, and he was discharged after 17 days in hospital. Review at intervals during the next month revealed no abnormality, though his mother stated that he was fretful and irritable at home. Tests for bromate in the urine on the third day were negative.

Discussion

Goodman and Gilman (1941) state that bromides depress the activity of the nervous system but have little effect on the kidneys or other tissues. However, bromates which do not release the ionic form do not possess the actions of the ionizable bromide salts. Bromates are only partly reduced in the tissues, and, according to Santesson and Wickberg (1913), are toxic to animals, producing among other features apathy, vomiting, diarrhoea, and depression of the central nervous system, particularly the respiratory centre. These workers also noted conspicuous changes in the kidneys, especially tubular degeneration.. Some of these features were noted in our patient.

The toxic effects in the patient described by Dunsky (1947) were similar to those in this boy, but his patient developed anuria, which persisted with convulsions until death. Necropsy revealed gross tubular damage in the kidneys. Other findings were hepatitis, pulmonary oedema, and toxic myocarditis.

It is estimated that this boy swallowed 60 gr. (4 g.) of potassium bromate, but no evidence is available of the amount consumed in the other cases.

We asked the manufacturers of the home hair-waving outfit for information about recommended methods of treating poisoning caused by accidental swallowing of neutralizing solution, and they obtained the following guide from their New York headquarters:—(1) Emetic: (*a*) teaspoonful of mustard powder in glassful of warm water, or (*b*) zinc sulphate, half teaspoonful in warm water followed by copious drinks of water, or (*c*) apomorphine, 5 mg. intramuscularly, and/or (*d*) wash out the stomach with stomach tube. (2) Sodium thiosulphate (hypo)—one level teaspoonful in water. This may precede but should follow the emetic. (3) Demulcent drinks such as milk, flour and water, or cereal gruel. (4) If shock is present, treat for shock, but avoid central nervous stimulants. (5) For pain (gastritis) give morphine, 15 mg. subcutaneously. Dose for children 5 mg. or more, depending on age and weight. (6) Sodium thiosulphate solution 1% intravenously by drip, 100 to 500 ml. If not feasible, give 10 to 50 ml. of a 10% solution.

Investigation in this hospital has shown that, after incubation of normal gastric juice at 38° C. with potassium bromate for periods of up to three days, no bromide or bromine was released. Bromine was not liberated in acid solution unless the *p*H was below 1. This agrees with other experimental evidence that bromate is absorbed unchanged. The bromate used by the manufacturers of the home-perm sets showed no evidence of bromide contamination.

In the presence of dilute HCl and thiosulphate some bromate is reduced to bromide, but in addition there is some reduction of thiosulphate to sulphide, which is in itself a powerful irritant and toxic agent. For this reason oral administration of thiosulphate is not advised.

We would criticize the use of apomorphine, as vomiting is severe in established cases, and suggest that stimulants such as nikethamide may be required when the respiratory centre is depressed. Fluids should be given if necessary intravenously when vomiting is protracted.

Immediate evacuation of stomach contents and gastric lavage with normal saline are of the utmost value, as we have information that when small quantities have been consumed and an emetic was given speedily no toxicity was observed.

Summary

The patient here described was a child of 3 years who had swallowed about a quarter of a pint of a solution of potassium bromate—60 gr. (4 g.)—used as a neutralizer in a "home-perm" outfit. The child was very ill for some days, but was discharged from hospital completely recovered 17 days after admission. Emergency treatment should include emptying of the stomach and gastric lavage with normal saline.

Our thanks are due to Mr. J. U. Lewin, chief chemist, Gillette Industries Limited, for his immediate co-operation, and to Dr. T. Kay Maclachlan for permission to publish this case report.

REFERENCES

Carratala, R., and Urcaray, L. (1941). *Rev. Assoc. méd. argent.*, **55**, 529.
Dunsky, I. (1947). *Amer. J. Dis. Child.*, **74**, 730.
Goodman, L., and Gilman, A. (1941). *The Pharmacological Basis of Therapeutics*. Macmillan Co., New York.
MacKenna, R. M. B. (1950a). *British Medical Journal*, **1**, 493.
—— (1950b). *Lancet*, **1**, 424.
Santesson, C. G., and Wickberg, G. (1913). *Skand. Arch. Physiol.*, **30**, 337.

PREGNANCY PROLONGED BEYOND THE EXPECTED DATE

BY

DOUGLAS LATTO, M.B., Ch.B., D.Obst.R.C.O.G. M.R.C.O.G.

Assistant in the Nuffield Department of Obstetrics and Gynaecology, Radcliffe Infirmary, Oxford

The term "post-maturity" has purposely been avoided in the title of this article, as it implies that this state is pathological.

It is generally agreed that the baby born at term (after 40 weeks' gestation) has the best chance of survival. It is also generally supposed that with post-mature babies, as with premature babies, there is an increased mortality. To many people, therefore, it seems that labour should be induced as soon as the pregnancy becomes post-mature; and there is evidence of a growing tendency for such induction to be performed by many obstetricians. Mills (1950) states that he induces labour in all cases in which pregnancy goes ten days beyond the expected date of delivery. Malpas (1950) says that he advises induction if the patient goes three days beyond the expected date of delivery. That these policies are not always justifiable will be obvious from the following considerations.

The duration of pregnancy varies considerably in humans, and, as in all biological measurement, there is an expected variation on each side of the "mean." With regard to the size of the baby, there is also variation: it is stated in standard textbooks that a baby at term may weigh anything from 5 to 10 lb. (2.3 to 4.5 kg.). It is also known that in women with long menstrual cycles pregnancy tends to become post-mature. For these reasons alone a cut-and-dried policy of routine induction at ten days, or at any other precise period after the

expected date of delivery, is difficult to uphold ; by such fixed methods some of the art of obstetrics is inevitably lost.

Gibson and McKeown (1950), in Birmingham, found that 31.72% of women in their series of 17,072 cases went seven days beyond the expected date of delivery. If, therefore, obstetricians were to induce labour in all cases in which pregnancy goes seven days beyond the expected date the induction rate would be as high as 31.72% for post-maturity alone, which would amount to 250,000 inductions annually in this country.

Another reason for the increased tendency to perform surgical induction of labour is that the operation now carries a very low mortality or morbidity, especially when performed under a penicillin or chemotherapy shield. But, although low, the mortality and morbidity directly or indirectly attributable to this procedure is by no means negligible. It therefore seems fair to state that the decision for or against induction of labour should rest on something more substantial than an estimate of the duration of pregnancy as judged by the reported date of the patient's last menstrual period.

Aetiology of Post-maturity

Because the cause of the onset of labour is unknown —although doubtless influenced by the convergence of structural, hormonal, nervous, circulatory, and nutritional factors—the aetiology of post-maturity is also obscure. The following factors must, however, be regarded as of importance.

Heredity.—There seems to be a hereditary tendency towards post-maturity. Not infrequently the patient gives a history that her mother also went beyond the expected date (Kerr and Moir, 1949).

Constitution.—The same patient may have several post-mature babies. One patient of mine had five children, and on each occasion there was a normal delivery of an average-sized baby after 44 weeks' gestation. As previously stated, there is a greater chance of post-maturity with women with a menstrual cycle of 31–35 days than with women having a cycle of 21–28 days. This is presumably due to a lengthening of the pre-ovulatory phase of the menstrual cycle.

Rest in Bed.—This may be a factor in prolonging pregnancy. This rest is generally supposed to help in prolonging pregnancy in cases in which premature labour is feared—for example, in multiple-pregnancy cases.

Hormones.—Animal experiment shows that hormonal imbalance plays a part in producing post-maturity ; Snyder (1934) was able to procure post-maturity in rabbits by giving progesterone or chorionic gonadotrophin ("antuitrin S"). In humans the problem is more complicated: progesterone does not necessarily prolong pregnancy, although such prolongation has occasionally been reported.

Malpresentation and Cephalo-pelvic Disproportion.—These are frequent causes of post-maturity. In such cases the lower uterine segment is poorly formed and there is no stimulus from an even pressure of the presenting part on the lower pole of the uterus. Browne (1946) states that post-maturity is more apt to occur when the foetal head is above the pelvic brim. According to Malpas (1933), the anencephalic (without associated hydramnios) and the hydrocephalic head do not fit well into the lower pole of the uterus to stimulate polarity, and thus bring about the conditions favourable to post-maturity. It is generally agreed that the occipito-posterior position is, for similar reasons, another common cause of post-maturity, as it is of inertia and poor uterine contractions when labour does start.

Present Investigation

An analysis has been made of the last 4,653 deliveries in the Nuffield Department of Obstetrics in the Radcliffe Infirmary, Oxford. There were 171 in which pregnancy was reckoned to have continued for 42 weeks since the first day of the last menstrual period. This represents an incidence of 3.7%. Of these patients, 42 (24.5%) required a forceps delivery, and 12 (7%) required caesarean section. Thus, in about one-third of the cases operative intervention was deemed necessary. This series therefore confirms the high incidence of cephalo-pelvic disproportion or of malpresentation in association with post-maturity.

Of the nine stillborn babies, four had gross abnormalities incompatible with life. Of the remaining five, only one case could be attributed to post-maturity.

Case Report.—Patient aged 21 years. *First Pregnancy:* Delivery of a stillborn baby 15 days after the expected date of confinement (August 25, 1947). Male child, weight 4 lb. 2 oz. (1.9 kg.). Placenta small and infarcted, weight, 318 g. Blood group, A, Rh+ ; Wassermann reaction and Kahn test negative. *Second Pregnancy:* Elective caesarean section seven days after the expected date of confinement (July 17, 1948). Female child, weight 4 lb. 6 oz. (2 kg.) ; died in 11 hours. Post-mortem report: atelectasis of lungs. Placenta small, as with previous pregnancy. Pathological report: "trophoblast wholly syncytial and is evenly distributed ; the villi give the appearance of a 28–30 weeks' gestation period." *Third Pregnancy:* Elective caesarean section four days before the expected date of delivery (January 16, 1950). Male child, 6 lb. 6 oz. (2.9 kg.). Baby survived. Placenta small and infarcted.

The above syndrome of a small baby and a small placenta with intrauterine death occurring in consecutive pregnancies is rare, but it has been occasionally observed, and may result in foetal death not only in the post-mature period but at any time before the expected date of delivery.

When the death occurs *before* term the cause is often stated to be "undetermined." In contrast, a death occurring *after* term is usually ascribed to placental insufficiency—and often, it seems, with little justification. In order to obtain a balanced picture of the incidence of intrauterine deaths, the histories of 154 stillborn babies were studied. Twenty-one were found to have died *in utero* from no apparent cause. Of these 21 only one was post-mature (the case mentioned above).

The results given by von Ruette (1949) so closely parallel the results of the present investigation that they are included for comparison, although the conclusions of that worker are different. (Von Ruette studied cases in which amenorrhoea had lasted for 290 days or over.)

Stillbirth and Neonatal Deaths in Post-mature Babies

	Oxford	Basle (Von Ruette)
Total No. of post-mature babies	171	1,003
Neonatal deaths	2	6
Stillbirths	9	22
Analysis of stillbirths:		
Foetal abnormalities	4	6
Toxaemia	1	3
Prolapse and other cord complications	0	7
Induction of labour	2*	2
Impacted shoulder presentation	1	0
Cause of death unknown, ?post-maturity	1	4

* One associated with over-administration of quinine; one with over-administration of "pitocin" (5-unit doses).

Clayton (1941) may also usefully be quoted. In 705 cases in which pregnancy was of 42 weeks' duration or more he found no intrauterine deaths due to post-maturity and only two stillbirths of an unexplained nature, but possibly due to post-maturity.

Treatment of Post-maturity

From the foregoing evidence the following views on treatment seem justifiable:

Overmuch weight should not be given to the occurrence of post-maturity *per se*. For uncomplicated post-maturity no treatment is required: this also is the opinion of Clayton (1941) and of Wrigley (1946). The patient should be reassured, but she should not be admitted to hospital, for rest serves no useful purpose. A medical induction is not reliable as a test for post-maturity, nor is it likely to succeed in the case in which the head is high or the cervix is long and uneffaced.

If post-maturity is complicated by a minor degree of cephalo-pelvic disproportion, surgical induction may sometimes be desirable. Munro Kerr and Chassar Moir state: "Management of post-maturity largely resolves itself into the determination of the size of the foetus relative to the pelvis." In deciding for or against induction of labour, each case should be individually considered and routine induction avoided. Better subsequent uterine contractions and minor improvements in the attitude and position of the child may more than compensate for a week's delay.

With a history of a stillborn small baby associated with a small placenta, induction is advisable a few weeks before the time when the previous baby died. As already stated, these cases are rare.

Nothing in the foregoing remarks is intended to imply that the high head, possibly in the occipito-posterior position, is free from danger to mother and baby. These cases require careful watching and management.

Conclusions

Post-maturity with placental insufficiency is extremely rare. In the present series of 171 post-mature pregnancies it accounted for only one death.

A foetus may die *in utero* for no apparent cause at any time during pregnancy. Deaths during the post-mature period in the 171 post-mature cases amounted to no more than 9 (5.2%). In all save one of these an adequate cause for death was found.

Malpresentations and cephalo-pelvic disproportion are a frequent cause of a high presenting part and a poorly formed lower uterine segment, and are hence the cause rather than the result of post-maturity.

In hospital statistics the foetal mortality tends to be high in post-mature cases. This is because the selection of patients is different from that of patients going into spontaneous labour at term, and failure to diagnose disproportion is common.

The problem of post-maturity resolves itself, to a great extent, into the proper management of malpresentations and minor degrees of cephalo-pelvic disproportion.

REFERENCES

Browne, F. J. (1946). *Ante-natal and Post-natal Care*, p. 134. Churchill, London.

Clayton, S. G. (1941). *J. Obstet. Gynaec. Brit. Emp.*, **48**, 450.

Gibson, J. R., and McKeown, T. (1950). *Brit. J. soc. Med.*, **4**, 221.

Kerr, J. M. Munro, and Moir, J. Chassar (1949). *Operative Obstetrics*, p. 112. Baillière, Tindall and Cox, London.

Malpas, P. (1933). *J. Obstet. Gynaec. Brit. Emp.*, **40**, 1046.

—— (1950). At meeting of North of England and Birmingham and Midland Obstetrical and Gynaecological Societies, Nottingham, October 13, 1950.

Mills, W. (1950). At annual meeting of British Medical Association, Liverpool, 1950. In press.

Snyder, F. F. (1934). *Bull. Johns Hopk. Hosp.*, **54**, 1.

Von Ruette, U. (1949). *Schweiz. med. Wschr.*, **79**, 1123.

Wrigley, A. J. (1946). *Proc. roy. Soc. Med.*, **39**, 569.

Medical Memoranda

Fatal Case of Acute Ulcerative Colitis with Multiple Perforations

The outstanding features in the following case are the acute onset with no previous history of ulcerative colitis and the complete lack of signs which would lead to a diagnosis of intestinal perforation.

Case Report

A housewife aged 27 was admitted to hospital with a history of some years' constipation and pain and bleeding from an anal fissure. The anal canal was dilated and the fissure excised. The surgeon made a note that there was considerable oozing from the upper rectum, which would require further investigation when the fissure had healed.

Five weeks after the operation the patient was readmitted with a history of diarrhoea for the past two weeks, with blood and mucus in the stools. The abdomen was not distended but was slightly tender. Her temperature was 101.4° F. (38.55° C.). On admission she was given 100,000 units of penicillin four-hourly. Her temperature stayed at 101–103° F. (38.3–39.4° C.) for three days, when 3 g. of phthalylsulphathiazole was given four-hourly in addition to the penicillin. This reduced her temperature to normal by lysis in two days, where it stayed; but her condition deteriorated, the abdomen showing tympanitic distension and, although fairly solid, having a doughy feel. The motions were four or five a day and were liquid, greyish in colour, and very offensive. Repeated laboratory examinations of the blood and faeces yielded no useful information. The patient became gradually worse, and in spite of blood and saline transfusions she died 10 days after admission.

At necropsy the abdominal incision opened into a cavity containing liquid faeces. This cavity was bounded anteriorly by the abdominal wall and posteriorly by the omentum, which was firmly bound down to the colon all the way round and to the posterior brim of the pelvis. So complete was this attachment that the coils of the small intestine under this floor showed no sign of peritonitis. There were numerous perforations in the large intestine; two in the ascending colon, each nearly 2 in. (5 cm.) long and over 1 in. (2.5 cm.) wide; three in the transverse colon of about the same size; and six in the descending colon. These varied in area from the size of a halfpenny to one which was 3 in. (7.5 cm.) long and involving most of the wall. All the ulcers had ragged edges. Where the colon turned over the brim of the pelvis the gut was reduced to one longitudinal muscle band, and the almost free end of the pelvic colon was expanded to resemble a funnel and filled the space between the sacrum and the uterus.

It would appear that liquid faecal matter found its way through the numerous perforations into this false cavity and eventually was collected by the pelvic funnel and passed as a diarrhoeic stool. Histological examination of the wall of the intestine as far away as possible from a perforation showed the mucosal epithelium to be almost completely denuded. The mucosa and submucosa, and in parts the whole wall, were diffusely infiltrated with plasma cells and lymphocytes and some polymorphs. At the edge of the ulcers there was an acute pyogenic exudate into the mucosa.

LOUIS L. GRIFFITHS, M.D., D.P.H.
Consultant Pathologist.

LEO GILCHRIST, M.D., M.R.C.P.
Consultant Physician.

Farnborough Hospital, Kent.

A Case of Q Fever

The following case of Q fever may be found of interest. The source of infection is unknown, and is being investigated. So far as can be ascertained, no previously recognized cases have occurred in the same area.

Case Report

The patient was a retired Indian cavalry officer aged 58, with a good medical history. Apart from dengue fever in 1913, and malnutrition while a prisoner of war in Bulgaria in 1918, he has always enjoyed good health. The present illness began on the evening of April 25, 1950, with general muscular aching. During the night he had a rigor and a very heavy sweat. When seen next morning his temperature was 100.3° F. (37.95° C.) and pulse 88. On examination some injection of his pharynx was found, but otherwise physical examination was negative. The heart sounds were pure and closed; blood pressure was 140/80; the lungs were clear. He complained of muscular aching in his limbs, and said that he felt bruised all over. Influenza was diagnosed, it being epidemic in the area, and he was treated accordingly.

When next seen, on April 28, the picture had changed considerably. His temperature had remained up, swinging between 101 and 103.5° F. (38.3 and 39.75° C.); he had had some very heavy sweats and a rigor during the previous night. He still complained of much pain in his musculature and had developed a slight cough. On examination his temperature was 102° F. (38.9° C.), pulse 88, and respirations 30. He was markedly dyspnoeic and cyanosed, with a dusky flushed face. There were scattered rales and rhonchi all over both lungs. As he was obviously pneumonic full doses of "sulphatriad" were given, together with 200,000 units of crystalline penicillin in the morning and 300,000 units of "distaquaine" penicillin at night.

During the next two days his condition remained unchanged. He was cyanosed and dyspnoeic, with fever swinging between 101 and 102.5° F. (38.3 and 39.15° C.), and with a pulse rate of 80 to 90. His muscular aching was troublesome, but cough was not a striking feature. His physical signs remained unchanged.

By the morning of May 1 he had developed signs of consolidation in his right upper lobe, with impairment and faint bronchial breathing best heard in the axilla. His general condition remained unchanged, and he did not give cause for anxiety. There was no sign of response to the sulphonamides and penicillin, and it was thought probable, therefore, that he had an atypical virus pneumonia. An *x*-ray film of the chest showed a consolidation of the right upper lobe spreading outwards from the root, the remainder of the lung fields being clear. A blood count made by Dr. Lazarus Barlow showed: haemoglobin, 16 g. % (100% Sahli); red cells, 4,900,000 per c.mm.; C.I., 1.0; leucocytes, 2,800 per c.mm. (polymorphs 66%, monocytes 5%, lymphocytes 29%). Cold agglutinins were present at 1/80.

In view of the *x*-ray appearances, the leucopenia, and the presence of cold agglutinins, the diagnosis of atypical virus pneumonia was thought to be correct. The sulphatriad was therefore stopped and the patient was kept under penicillin guard.

During the next day violent shooting pains in the face, head, and limbs developed. These were quite transitory but severe, and were accompanied by violent twitching in the muscles. Those in the face were reminiscent of a tic douloureux; those in the limbs produced a jerk sufficient to disarray the bedclothes. They led to much disturbance of sleep, but were not associated with any positive physical findings in the C.N.S.

On May 3 the patient was seen in consultation with Dr. J. M. Ranking, of Tunbridge Wells. His condition was unchanged except that he appeared to be developing a macular rash, which was then visible only on his back. Dr. Ranking agreed with the provisional diagnosis, but suggested that the possibility of Q fever should be considered. This had already been discussed with Dr. Barlow, who had kept some of the patient's serum in case further investigations should be required. Dr. Barlow was accordingly asked to forward this serum to the Virus Reference Laboratory at Colindale. Dr. Ranking obtained some "aureomycin," and treatment with this was begun at midday—two capsules six-hourly.

By the morning of May 4 there had been a most dramatic response to the aureomycin. The temperature was normal and the pulse rate 72. The patient looked and felt much better; the muscular pains and twitching had vanished overnight. He was, however, covered with a macular rash, dusky red in colour, most pronounced on the back, where it had first appeared, but also prominent on the front of the trunk and the limbs. The face was not involved. For the first time his spleen was easily palpable. He was no longer cyanosed, there were signs of resolution over the chest lesion, and his urine showed a trace of albumin only, red blood cells not being present.

Thereafter his improvement was steady and rapid. The aureomycin was continued until his temperature had been normal for four days. By May 16 his rash had gone, his spleen was no longer palpable, his chest was clear, and he was eating and sleeping well. He has remained well since.

The following additional investigations were carried out: Paul–Bunnell test: negative at 1/10. A blood culture showed no growth after seven days. The Widal test showed agglutination to a dilution of 1/120 in *Salmonella typhi* H only; no agglutination in the remainder of the typhoid, paratyphoid, or abortus group. Sputum: tubercle bacilli were not found; cultivation yielded a scanty growth of non-haemolytic streptococci. Faeces: no pathogenic organisms cultivated. Complement-fixation tests carried out by Dr. B. P. Marmion at the Virus Reference Laboratory, Colindale, showed:

Day of Disease	Complement-fixation Tests				Agglutination
	Influenza		Q Fever	Psittacosis L.G.V.*	Streptococcus M.G.
	Sol. A	Sol. B			
10 ..	<1/4	<1/4	<1/8	<1/8	<1/10
14 ..	<1/4	<1/4	<1/16	<1/8	<1/10
5 weeks ..	Not tested	Not tested	<1/256	Not tested	Not tested

* The psittacosis-lymphogranuloma venereum group of viruses.

This man's illness, therefore, was certainly due to infection with *Rickettsia burneti*. The striking features of this illness were the pneumonia, which gave rise to some anxiety, the rash, the enlarged spleen, and the signs of involvement of the C.N.S. It was worthy of note that throughout the illness his pulse rate was never as rapid as one would have expected from the degree of fever. A most encouraging result was obtained from the use of aureomycin, the illness literally being cut short and all anxiety ended within 36 hours.

I am greatly indebted to Drs. Barlow and Marmion for the investigations they carried out in this case, to Dr. W. Addey for the *x*-ray films, and to Dr. Ranking for his advice and his help in obtaining the aureomycin.

H. CAMERON, M.R.C.S., L.R.C.P.

At present there are no schools for mentally handicapped children in the Isle of Man, and the question of providing accommodation for them on the island is shortly to be discussed (School Medical Officer's *Report*, 1950). The dental department is now up to full establishment, and there are four full-time dental officers—one temporarily for six months. During the year 2,517 medical examinations were carried out, and 15% of the children needed treatment. Schoolchildren on the island are drinking about 800 pints of milk a day, and nearly half of this amount is supplied free.

Reviews

ANATOMICAL ATLASES

Atlas of Human Anatomy. By M. W. Woerdeman, M.D., F.R.N.A.Sc. Volume 1: Osteology; Arthrology; Myology. (512 illustrations. £3 10s.) Amsterdam: Wetenschappelijke Uitgeverij. London: Butterworth and Co. 1948.

Volume 2: Splanchnology; Angeiology; Nervous System; Organs of Sense. (642 illustrations. £3 3s.) Amsterdam: Wetenschappelijke Uitgeverij. London: Butterworth and Co. 1950.

An Atlas of Human Anatomy. By Barry J. Anson, Ph.D. (Pp. 518; illustrated. £2 17s. 6d.) London and Philadelphia: W. B. Saunders Company. 1950.

Visual Anatomy: Head and Neck. By Sydney M. Friedman, M.D., Ph.D. (Pp. 217; illustrated. £2 7s. 6d.) Springfield, Ill., U.S.A.: Charles C. Thomas. 1950. Oxford: Blackwell Scientific Publications.

Since the days when Atlas held the heavens above the earth his name has been attached to increasingly diverse collections—of maps, drawings, even anatomical illustrations. Certain it is that the massive expensive atlases of wood, copper, steel, and mezzotint engravings have had their day. They are expensive to house and to repair. They belong with the amenities of the eighteenth century, although a few superb atlases appeared as late as the earlier years of the twentieth century.

The wood engravings of J. S. Calcar in the famous *De Fabrica* of Vesalius (1543) had a truth and exactitude beyond reproach in terms of the standard of dissection at that time. The gentleness and feeling of Calcar's wood engravings gave place to the dry, hard exactitude of the copper engravings of Eustachius. These were completed as early as 1552 but were rescued from oblivion by Lancisi, physician at the Vatican, who published them in 1714 as the famous *Tabulae Anatomicae.* The last magnificent folio published in the eighteenth century was Mascagni's *Vasorum lymphaticorum corporis humani historia et ichnographia* (1787), illustrated on copper by Santi of Bologna.

At the end of the nineteenth century appeared two octavo atlases, that of Carl Toldt (1896–1900) in one volume and that of Werner Spalteholz in three volumes (1895–1903). The Spalteholz atlas gained popularity because of the high quality of the parti-coloured lithographs. Moreover, it was translated into English by Lewellys F. Barker, of the Johns Hopkins Medical School (1900–3). The smaller quarto atlas of J. Sobotta appeared in 1904 and was more of a handbook.

There is another type of atlas which provokes more thought—the cross-section atlas based on frozen sections of the cadaver. The first important one was that of N. I. Pirogoff, which appeared in folio and octavo 1852–9. This was followed by Braune's folio in 1867–72. An English translation by Bellamy appeared in 1877. Symington published the *Topographical Atlas of the Child* in 1887, and Eycleshymer and Schoemaker published their *Cross-Section Anatomy* in folio in 1911. This accurate atlas of 113 cross-sections is of the greatest use to radiologists and radiotherapists.

There is a strange disease running through modern schools, from junior schools to universities. It is called "Visual Aids." It calls for expensive projectors, screens, and filmstrips of doubtful value. The nursery and infant schools have been spared this curse, for young children are too healthily active to be bored by pictures—stills or movies. They insist on handling things, feeling, biting, and breaking; using hand, eye, ear; and developing three-dimensional sense in the parietal lobe of the cortex. At six months a child recognizes the front or the back view of his mother. He mauls her. This practical method of acquiring knowledge decreases steadily from then onwards.

There is a basic objection to all forms of pictorial art, for it places the barrier of someone else's vision in the way of the student's apperception of the structure and build of the object. It may produce a form of mental laziness and hebetude and persuade the student that, having seen, therefore he has understood.

The first two volumes of Woerdeman's *Atlas* are mainly reproductions in black-and-white of drawings and diagrams, with an occasional plate in colour. There is no text. The diagrams are numbered and labelled in the B.N.A. Latin terminology, with an English translation of most of the titles. The translation is often awkward and the spelling is strange. Anulus may be more correct etymologically than annulus, but it is not common usage. There is an incomplete list of errata at the end of each volume. The author is engaged on Vol. 3, which will include regional anatomy and radiographic anatomy. In spite of the professed adherence to the B.N.A. terminology certain strange eponyms creep in. Several lymph-nodes (lymphoglandulae) are associated with the names of Bartels, Virchow, Ewald, Troisier, and Botallus. The ligamentum iliofemorale is associated with the name of Bertin, not the more familiar Bigelow. Considerable space is devoted to subcutaneous nerves, their segmental distribution and associated autonomous supply. Langer's lines of cleavage in the skin are figured.

The *Atlas of Human Anatomy*, by Professor Barry J. Anson, of the Northwestern University Medical School, Chicago, is essentially regional, and illustrates the head, neck, upper limb, back and thorax, abdomen, pelvis, and lower limb. It fits into the scheme of dissection of the cadaver adopted in most medical schools. The labelling of the drawings, a few of which have some colour, is in the B.N.A. Latin terminology. Footnotes form a sort of running commentary on the build and purpose of the diagram. These are in English. The illustrations are very variable in quality, for they are partly culled from the existing medical journals, especially the anatomical and surgical journals. There is an ambitious attempt to include the common variations seen in the operating theatre. The atlas is likely to stimulate the student to look in the dissecting-room. On the other hand it may reduce him to a state of perplexity and inanition, for many of the diagrams are too complicated. The omissions are startling. The breast, lymphatic glands in general, and many facts of prime importance in the clinic are treated with scant respect. The index is not a good working index, for neither breast, mamma, nor mammary glands are given. The only lymph glands mentioned are the inguinal group.

The third atlas, *Visual Anatomy*, by Professor Sydney Friedman, of British Columbia, is an attempt to curtail drastically the volume of preclinical anatomy retailed to the student. This volume is on the head and neck. The diagrams are of the crude blackboard type, and are labelled in a loose English translation of the B.N.A. Each diagram is faced by a text which is often inconsequential and sometimes wrong. The diagram of the auditory apparatus depicts the chorda tympani nerve, and the text describes it as arising from the facial nerve

"as it passes above the oval window." The origin of this nerve is within 1 cm. of the stylomastoid foramen.

The retropharyngeal lymphatic glands, so often involved in children after the acute exanthemata, are not mentioned. The complex arrangement of glands superficial or deep to the parotid gland, or within it, are grouped together as "preauricular." The preauricular gland is superficial to the deep fascia running from the zygoma to invest the parotid gland and may be moved in any direction. The other glands may be moved from side to side, but never downwards.

As a test of the need for precise anatomy in relation to clinical significance the actual course of the mandibular branch of the facial nerve was checked in all three atlases. Not one indicates that this nerve descends into the neck and then climbs up on the mandible to supply the muscles at the corner of the mouth. One atlas does refer to this branch as the ramus marginalis mandibulae, but this is not enough to protect the patient; for this nerve is often cut when opening an abscess in the submandibular triangle.

A similar test was applied in relation to the venous drainage of the scalp and the kidney, the portal-systemic venous anastomoses, and the significance of the relation of the capsular line to the epiphysial line. All three atlases are distinct. That of Woerdeman more closely approaches the Spalteholtz. That of Anson has a bewildering mass of detail. That of Friedman reduces anatomy to an inefficient minimum. The student, in fairness to the living patient, must subject himself to the discipline of such anatomy as was depicted and described in Gray's *Anatomy* (1858) and in Quain's *Anatomy* (10th edition, 1890–6).

The medical student is rapidly being reduced to the state of the boy who studies Euclid without the text. The future conjures up a picture of an undissected cadaver in a plastic mould surrounded by dumb students and a more dumb demonstrator carrying several atlases. Q.E.D. and Q.E.F. will no longer have any significance. Medicine is an oral art, not a pictorial one. St. Paul put it pithily when he said, "Except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? For ye shall speak unto the air."

H. A. HARRIS.

THE SHOULDER GIRDLE

Surgery of the Shoulder. By A. F. DePalma, M.D. (Pp. 438; 454 illustrations. £7.) Philadelphia and London: J. B. Lippincott Company. 1950.

Codman's book on the shoulder, published by himself in 1934, has long been unobtainable, and there has been an obvious need for an up-to-date reference book on the subject. This has been fully met by Professor DePalma's monograph. The typography and illustrations make the book a pleasure to read and handle. It is one of the most delightfully produced medical works which has appeared, and has obviously been a labour of love in which no effort has been spared on illustration, detailed description, and bibliography. The contents of the book would be better indicated if it were called the "Surgery of the Shoulder Girdle," for it covers lesions from the shaft of the humerus to the cervical spine.

Some sentences have an odd ring about them, for medical clichés and prolixity are substituted for simple English. The style does not make the book any less readable, though irritating to the purist. The introductory sentence to the third chapter, "Hitherto an orderly study of the variational anatomy and degenerative lesions of the shoulder had not been done," might read, "An orderly study of the variations in anatomy and degenerative lesions of the shoulder has not been made." This chapter is the freshest contribution to our knowledge in the book, and is based on the detailed study of 452 shoulders, of which 208 were examined post mortem. The information thus obtained ranks with Scheuermann's on the spine, and forms a basis, previously lacking, for a study of the abnormal. It has thus been shown that many lesions of the rotator cuff are compatible with good function, and the author provides strong evidence to support his contention that operative treatment should only follow failure of recovery.

American writers have long been averse to accepting in full that the lesions described by Bankart are the genesis of recurrent dislocation of the shoulder. It would not be correct to say that this volume gives them unequivocal support. The pathological findings are accepted and to most provide a complete explanation, but the author believes that over and above these there must be a "neuromuscular" imbalance, the muscular defect being produced by the stretching of the affected muscles. The main basis for this statement is his discovery of the essential "Bankartian" lesions in the ageing shoulder without dislocation. The known occasional case in which redislocation becomes less frequent with age is attributed, and probably correctly, to increasing capsular fibrosis and loss of external rotation. It is therefore a little ungenerous to point out that as recurrent dislocations are a feature of the earlier decades of life, while the "Bankartian" lesions are a feature of the later decades, the two are not related, and to superimpose a vague hypothesis as the primary factor. Surely the absence of fibrosis in the earlier decades predisposes to recurrence.

Not all observers would agree that "it is common knowledge that calcareous tendinitis is the most frequent cause of painful shoulder." A figure of 43% is given as the incidence of this condition in 300 consecutive cases. In this country non-calcareous tendinitis is the most common cause, certainly in people over 45 years of age.

The approach to fractures of the upper end of the humerus is eminently practical, with its emphasis on function rather than reduction. There is a clearly illustrated and satisfying chapter on the tumours of the shoulder girdle. The chapter on shoulder pain of neurogenic origin is clear without being dogmatic, and helps to sort out for the reader these sometimes vague syndromes. The possession of this book will give daily delight, even though the cost is rather high.

J. G. BONNIN.

EXOTIC DISEASES

Exotische Krankheiten und Krankheitsverläufe. By F. O. Höring, Professor for Internal and Tropical Medicine at the University of Tübingen. (Pp. 407; 51 figures. M. 36.) Stuttgart: Georg Thieme. 1950.

The author, who has acquired experience from sojourn in warm climates for a considerable time before and during the second world war, has written this book on exotic diseases and disease-courses to help doctors who are likely to meet with exotic diseases in their own (non-tropical) homes, and to be of service to those who for one reason or another have to visit or practise in hot climates.

The work is a genuine handbook on the clinical, diagnostic, and therapeutic aspects of the subject, not omitting special features of ordinary non-tropical diseases as met with in warm climates and the Tropics. Names of authors' tests, experiments, and theories are often mentioned, but no list of bibliographical references is attempted; this would probably have taken up much space and possibly have confused the general picture as the author sees it. For typical examples of the author's methods the reader may refer to the short accounts of Plaut-Vincent angina and the possible supervention in the Tropics of noma (p. 17); to the account of typhus exanthematicus (pp 84 *et seq.*); and to the discussion on the different kinds of pneumonia and "pneumonitis" and respiratory diseases in our own (temperate) and in tropical climates.

Among many longer or shorter accounts specially to be noted are: sleeping sickness (African trypanosomiasis) (p. 223); the discussion on lepra (p. 261); eosinophilia and tropical eosinophilia (p. 384); yellow fever (p. 111) as a type of virus disease the pathology of which has been well worked out; typhoid fever, which may have a quite different clinical aspect in hot climates; the explanation of brucellosis (Malta fever, Bang's disease) and relapsing fever (p. 153); the malarial diseases and blackwater fever (p. 219); rat-bite fever as the type of a "zoonosis" and long known in Japan under the term "sodoku." On p. 390 attention is drawn to high blood pressure being less frequent in hot climates; on p. 388 it is noted that calcium-bilirubin (intrahepatic) calculi are commoner among natives of hot climates than among Europeans. On p. 37 there is mention of dysenteric arthritis and "Reiter's syndrome," the latter as a possible result of dysentery.

In addition to its use for doctors in hot climates and—in these days of quick and easy travelling—for those liable to see exotic cases in temperate climates, this excellent work, with its wide range of information, may obviously serve as a handy reference book for the study or consulting-room of any doctor in any climate who can read German.

F. PARKES WEBER

A SUCCESSFUL CONGRESS

Transactions of the XIIth British Congress of Obstetrics and Gynaecology. Editors in Chief: Alec W. Bourne, F.R.C.O.G., Professor W. C. W. Nixon. (Pp. 304; illustrated. £2 10s.) London: Published on behalf of the Congress Committee by Austral Press.

The Twelfth British Congress of Obstetrics and Gynaecology was held in London in 1949 under the presidency of Sir Eardley Holland, and for the first time in the history of these congresses the proceedings are published in book form. The joint editors, Mr. Alec Bourne and Professor W. C. W. Nixon, are to be congratulated on their work. The subjects discussed were caesarean section; hypertension in relation to pregnancy; diabetes complicating pregnancy; endometriosis; the diagnosis, prognosis, and follow-up of cervical cancer by vaginal smears and cervical biopsy; pelvic exenteration for advanced malignant disease; pregnanediol assays; the treatment of enterocoele; and maternal mortality. The variety of topics attracted a record attendance of more than 700 registered members, who heard papers of the highest standard from leading authorities from this country, from the United States of America, and from the continent of Europe.

It was the first meeting of its kind for 10 years, and was made the occasion for an impressive presentation of modern methods and results, some of the papers introducing almost a new outlook on such matters as caesarean section and radical surgery for malignant disease. Reports of the discussions clearly indicate that there was some disagreement on whether this outlook is progressive or retrogressive. The right conclusion is more likely to be reached by a leisurely and unprejudiced study of the published papers and statistics than in the heat and hurry of the conference room.

Much of the material gathered together in this volume is not obtainable from any other source, and its quality is such as to make it indispensable to those who would keep abreast of modern thought and practice in obstetrics and gynaecology. This record is a tribute to all those who contributed administratively or scientifically to what is acknowledged to have been a highly successful congress, and it is good value even for its high price.

T. N. A. JEFFCOATE

BOOKS RECEIVED

Review is not precluded by notice here of books recently received

A Complete Outline of Fractures. By J. G. Bonnin, M.B., B.S., F.R.C.S. 3rd revised ed. (Pp. 671. 42s.) London: William Heinemann. 1951.

Wayward Youth. By A. Aichhorn. (Pp. 236. 9s.) London: Imago Publishing Company. 1951.

Die Blutgerinnung in Theorie und Praxis. By Dr. J. Schmid. (Pp. 444. M. 50.) Vienna: Wilhelm Maudrich. 1951.

Was ist, was kann, was nützt Hypnose? By Dr. K. Schmitz. (Pp. 211. Paper cover, M. 9.50; stiff cover, M. 12.) München: J. F. Lehmanns. 1951.

Die Frühdiagnose des Uteruscarcinoms. By Professor H. Limburg. (Pp. 158. M. 14.80.) Stuttgart: Georg Thieme. 1950.

Behandlung Diabetischer Kinder. By Dr. K. Weisse. (Pp. 72. M. 4.90.) Stuttgart: Georg Thieme. 1951.

Herzschalldiagnostik in Klinik und Praxis. By Dr. J. Schmidt-Voigt. (Pp. 116. M. 9.60.) Stuttgart: Georg Thieme. 1951.

Behandlung Innerer Krankheiten. By Professor F. Hoff. 4th ed. (Pp. 41. No price.) Stuttgart: Georg Thieme. 1951.

Lewis's Library has been in existence for more than a century, and its catalogue, recently revised to the end of 1949, increases both in size and value with the years. The library is unique in the sense that a number of old medical works, difficult to find elsewhere and too scarce to be allowed out of other libraries, are available for borrowing. All modern British and American books have a place in the catalogue and reflect the wealth of medical, scientific, and technical material available in the library. The subject index included in the catalogue is not above criticism, for the subject headings are generally too broad and books are classified by title, which is not always the same as content. The publishers might consider giving in future editions the publisher and place of publication, for while the catalogue was intended only to show the books available in the library it has now become an invaluable reference work, and such additional information would bring it into line with other standard bibliographies, among which it deserves a place as one of the most useful medical book lists available. The complete catalogue (not Part I only, as stated last week) may be purchased from H. K. Lewis & Co., Ltd., 136, Gower Street, London, W.C.1, price 35s. (to library subscribers 17s. 6d.).

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY JUNE 16 1951

THE ANNUAL MEETING

By the time this week's *Journal* went to press the Annual Representative Meeting had begun its usual review of the work of the Association. The meetings are being held in B.M.A. House in the second half of this week, and the occasion was marked by the election as President of the B.M.A. for 1951–2 of Dr. A. W. S. Sichel, of Capetown. The *South African Medical Journal* was right in heralding this event as without precedent in the history of the B.M.A. There is no need to recapitulate here the reasons why it proved to be impossible to hold the proposed joint meeting with the South African Association in their own country. That the B.M.A. decided to ask Dr. Sichel to be its President for the coming year, and that he accepted the invitation, stresses the feeling of unity we have with our colleagues in the great dominion of South Africa and the fact that the cancellation of the joint meeting was due to no fault on our part or on the part of the South African Medical Association. In the words of the *South African Medical Journal*,[1] "The British Medical Association's gesture implies not only a great honour and distinction to our own President but also demonstrates the firm friendship and understanding that should and does exist between two fellow-Associations." Dr. Sichel has a long connexion with the Cape Western Branch. Since 1920 he has been continuously a member of the Branch Council; he held the office of Honorary Librarian of the Cape Western Branch for fourteen years and was President of the Branch in 1941. Since 1935 he has been a member of the Federal Council and has given freely of his services in the solution of the many problems facing the profession in his own country. Dr. Sichel was formerly President of the Ophthalmological Society of South Africa, and has acted as chairman of the Festival symposium on ophthalmology jointly arranged by the Royal Society of Medicine and the B.M.A. On Friday of this week he is giving his Presidential Address in the Central Hall, Westminster.

Many of the matters before the A.R.M. this week are concerned with various aspects of the National Health Service. The feeling of general practitioners about the delay in settling their remuneration is expressed in a motion by Manchester which "urges the profession to submit their resignations from the National Health Service forthwith," and one from Lancaster reminds us that the profession is asking for the fulfilment of the Spens Report and not for an increase of any agreed remuneration—a matter referred to in another leading article. A motion by Marylebone draws attention to the fact that the cost of the general-practitioner service is 10.2% of the cost of the N.H.S. as a whole, and stresses that opportunities for clinical work by general practitioners have diminished. Other motions underline the dissatisfaction of general practitioners at their exclusion from hospital work and also with the difficulties experienced in the past year in getting patients into hospital when the need was urgent. A series of motions on the maternity medical services again gives point to the anxiety felt by general practitioners about the part they wish to play in this important branch of their work; another motion draws attention to the need they experience for the facilities of modern medicine in diagnosis. The position of registrars and of senior and junior hospital medical officers still causes concern to those who are watching over the consultant and specialist side of the N.H.S., and it is interesting to note that one motion advocates that all those "who aspire to specialist or consultant status should have had at least one year's previous experience of general practice." That some disquiet still exists about the relationship of the Autonomous Bodies to the B.M.A. is suggested by motions by Hendon and by Westminster and Holborn, and in this connexion there will be a recommendation from the Council that the autonomous powers of these bodies should be renewed for the year 1951–2.

The A.R.M. is often referred to as the Doctors' Parliament and no doubt, as in other parliaments, there will be keen discussion for and against many, if not most, of the motions to be debated. Those who have read the motions published in the last two issues of the *Supplement* certainly can find little evidence of apathy in the peripheral organization of the B.M.A. The N.H.S. has not impaired the vigour of the Branches and Divisions of the Association, and here, if anywhere, one can see the voluntary principle strongly at work. The shaping of the National Health Service will depend more upon the medical profession than upon the Ministry of Health, and that doctors in all branches of the profession are determined to do this is becoming increasingly manifest. A full report of this week's proceedings will appear in next week's *Supplement*.

[1] *S. Afr. med. J.*, March 24, 1951.

ARBITRATION ON G.P. REMUNERATION

The General Medical Services Committee decided at its meeting on June 7 to recommend the Conference of Local Medical Committees to seek arbitration on the remuneration of general practitioners. The case is very fully set out in a report published in this week's *Supplement*. As was stressed in a recent leading article,[1] the one fact that stands out in the confusion that inevitably surrounds a three-years-old controversy is the Spens Report on the remuneration of general practitioners. The recommendations of this report have been accepted by both profession and Government, and what remains to be determined is the translation of these in terms of the current value of money and of the earnings of other professions. To use what is an awkward but generally understood term, it is the "betterment" factor which is the 38th parallel between the Ministry of Health and the medical profession. The Government early on arbitrarily imposed its own factor of 20% (net)—a figure which bore no relation whatsoever to the altered value of money or to the earnings of other professions. Those representing general practitioners, finally tired of the diversionary activities of the Ministry of Health, now seek arbitration to decide what this factor should be. The Minister, anxious to reach a fair settlement, would surely be unwise to oppose this. The only way to break the deadlock is to lay the facts on the table before an impartial tribunal; the corollary of this is that both sides should accept its findings.

It may help to recapitulate some of the recent moves in the present controversy. Earlier this year the Minister of Health and the Secretary of State for Scotland agreed that there was a good case for reviewing, as a matter of urgency, the adequacy of the total remuneration of general practitioners and its distribution. There was, and still is, failure to agree upon a figure for practice expenses, the Ministry insisting on a figure no higher than 36.5%, the G.M.S. Committee, on the advice of an actuary, claiming 37.5%. When the Chancellor presented his Budget a ceiling of £400m. was placed upon expenditure on the N.H.S. This appeared to rule out the possibility of considering an increase in remuneration of general practitioners on the merits of the case. Rather, as it soon emerged, general practitioners would, on certain conditions, have to make do with the margin left between the actual cost of the Service and the arbitrary ceiling of £400m. These conditions were set forth in a letter from the Ministry of Health on May 23. First of all, the Ministry was not prepared to go beyond the residue of £2m., quite irrespective of the justice of the general practitioners' claims. Secondly, the Minister and the Secretary of State for Scotland were not prepared to recommend Parliament to provide this addition unless in future the maximum number of patients on a practitioner's list were reduced below the present level of 4,000. Thirdly, any additional money was to be made available to make it easier for new doctors to enter general practice and to improve the position of those with small lists. And, lastly, extra money was to depend on saving on the drug bill.

Whether these objects of the Ministry are or are not desirable is completely beside the point, and possibly designed by the Ministry so to be. One may comment here only that a progressive reduction in the size of lists brings nearer a whole-time salaried service and makes more remote the possibility of free choice of doctor. The Minister of Health is being asked to carry out the obligation accepted by the Government to fulfil the recommendations of the Spens Committee. We understand that the Government now knows how much from public sources general practitioners in varying proportions are earning. These ranges of income can be related to the ranges laid down in the Spens Report. What remains to be determined is the factor which should relate these to modern conditions, and it is on this point that the G.M.S. Committee is recommending the "Panel Conference" to seek arbitration. The Ministry's almost casual bait of £2m. is, we fear, designed to divert the attention of general practitioners from the Spens Report. If once practitioners allow themselves to be enticed away from the Spens recommendations then successive steps in the same direction would be swift and sure.

The G.M.S. Committee deserves the fullest support for resisting the Ministry's proposals and for its vigilance in insisting upon keeping to an agreement freely entered into by both profession and Government. It claims that the central pool must be adjusted to reflect the changed value of money since 1939 and to the alterations in income of other professions and to the number of practitioners in the Service; to this it adds that the Government's figure for practice expenses is inadequate. The G.M.S. Committee refuses to base its case on expediency, rejects the limitation set by an arbitrary ceiling unrelated to the Spens recommendations, and challenges the Ministry's suggestion that it might make extra money available by saving on prescriptions. No one denies that the pharmaceutical bill in the N.H.S. is excessive, but what else could the Government expect when it offered the public, apparently free of charge, anything

1 *British Medical Journal*, June 2, 1951, p. 1249.

it wanted in the chemist's shop from a pad of cotton-wool upwards. To try to escape from its folly by attempting to bribe the medical profession into prescribing less shows how little the Ministry has yet learnt about how to conduct its relations with both profession and public.

These interminable discussions have now been going on with the Ministry of Health for close on three years, and it is necessary to recall that general practitioners entered the N.H.S. in 1948 only on the promise of the Ministry of Health that their terms of service were open to negotiation. After these wearisome delays and tortuous arguments general practitioners cannot be accused of either intolerance or impatience, if, after three years' bafflement, they suggest the matter be submitted to arbitration. It is a profound pity that the Ministry's lack of realism has compelled the G.M.S. Committee to propose such a step, because in any arbitration one side or other is likely to regret the final decision.

THE FOUNDATION OF MENTAL HEALTH

Mental hygiene, although an extension of ordinary public-health work, goes further in that it alters the kind of people that compose the world. It is significant that the report[1] of the second session of W.H.O.'s Expert Committee on Mental Health concerns itself mainly with the management of infancy and childhood, thus taking for granted something which might not have been accepted by doctors 50 years ago—namely, that the basis of adult mental health is laid down in infancy and childhood, and of course in adolescence. The introduction to the report begins with the statement: "The most important single long-term principle for the future work of W.H.O. in the fostering of mental health, as opposed to the treatment of psychiatric disorders, is the encouragement of the incorporation into public-health work of the responsibility for promoting the mental as well as physical health of the community." The report then discusses the maternity services, the management of the infant and the pre-school child, the dependence of the pre-school child on the mother, school health in its wider aspects, and the emotional problems arising from physical handicap and from the isolation of children suffering from infectious diseases such as leprosy and tuberculosis. The committee recognizes that the mental health worker in training has more to do than to learn. The student is faced with "an emotional problem because of the nature of the subject matter quite apart from any intellectual difficulty in understanding the facts. Its initial emotional impact is far greater than that of the dissecting room or the operating theatre."

Along with the publication of this report there comes a W.H.O. monograph on "Maternal Care and Mental Health," written by Dr. John Bowlby, consultant in mental health to W.H.O., as a contribution to the United Nations programme for the welfare of homeless children. Dr. Bowlby, in his work at the Tavistock Clinic, has already shown that he appreciates the need for presenting psychological concepts in a form which appeals to the scientific worker trained to make the statistical approach, and it can be said at once that he has been successful in writing a remarkably interesting and valuable report. Compared with the amount of individual psychotherapy that is being done all over the world the investigations giving clear-cut results are few and far between: perhaps there are aspects of psychology which cannot yield results for the statistician. The success of this monograph is due in part to the choice of subject—the effect of the separation from their homes, and specifically from their own mothers, on the emotional development of infants and children, who, as Dr. Bowlby writes, "are not slates from which the past can be rubbed by a duster or a sponge, but human beings who carry their previous experiences with them and whose behaviour in the present is profoundly affected by what has gone before." Quoting convincing figures, he is able to show how separation can augment the tendency to the development of a psychopathic personality. Bowlby found that almost all workers in this field had arrived at the same conclusion: "What is believed to be essential for mental health is that the infant and the young child should experience a warm, intimate, and continuous relationship with the mother (or permanent mother-substitute) in which both find satisfaction and enjoyment." This is not new; it is what mothers and fathers feel, and it is what those who work with children have found. But what is new in this report is the attempt to translate the idea into figures.

There are three main sources of information: studies by direct observation of infants and small children; studies based on the investigation of early histories of those who are ill; and follow-up studies of groups of deprived children in various categories. Perhaps the main result of these inquiries, especially when they have been confirmed and amplified, will be to serve as a lesson for the medical profession, including the administrators. It must always be difficult for those who are making physical health their

[1] *W.H.O. tech. Rep. Ser.*, No. 31, 1951, Geneva.
[2] *Maternal Care and Mental Health*, 1951, Geneva.

specialty to keep the greater importance of mental health in mind. Emotional development can so easily be disturbed: the child in hospital who has forgotten its mother and who has reached the stage of making friends with anyone who comes along may be delightful to have in the ward, but it is a fact that a child, and especially a small child, cannot forget a parent without damage to the personality. Happily in children's wards and children's hospitals there is now a tendency to allow daily visiting. Admittedly this presents great difficulties to the nurses, but even the small amount of carefully controlled work which Bowlby is able to report on this limited aspect of the subject shows how worthwhile the extra trouble is.

Naturally the effect on the child of separation from its mother will depend on the degree of deprivation and also on the age of the child. The care of infants brought up in an institution from their earliest days was obviously due for reform, and in this country public opinion was firmly behind the Curtis Committee and the Children Act which followed in 1948. It is now becoming generally accepted that no child should be removed from the mother's care if this can be avoided—and this simple statement must not be obscured by the subsidiary fact that a minority of parents are themselves ill (in a psychiatric sense) and therefore bad for their children.

It would be a large task to teach the parents of the world how to be good parents, especially as most of them already know much better than we can ever tell them. It is appropriate therefore that W.H.O. should start at the other end in its consideration of mental hygiene, at the end at which teaching can have effect. The two important conclusions are that the impersonal upbringing of children tends to produce unsatisfactory personalities and even active antisocial characters and, secondly, that when there is anything like a good relationship between the developing infant or child and the parent the continuity of this relationship must be respected and must never be broken without good cause. Bowlby likens the acceptance of these facts to the acceptance of certain facts on the physical side of paediatrics, such as the importance of vitamins in the prevention of scurvy and rickets. Acceptance of the principle to which Bowlby's statistics point could lead to a reduction of antisocial tendencies and the suffering that lies behind them, exactly as vitamin D has lessened the incidence of rickets. Such a result would be a great achievement of preventive medicine, even without taking into account the deeper aspects of emotional development, such as richness of personality, strength of character, and the capacity for full, free, and mature self-expression.

POPULATION POLICY

In the last month three addresses have been reported in which reference was made to the eugenic aspects of sterilization. Professor Wallgren[1] was addressing the British Paediatric Association,[4] the Bishop of Birmingham[2] the West London Medico-Chirurgical Society, and Dr. P. Weintraub[3] was reporting to the Human Betterment Association of America on the study he had made of Swedish population policy. It is natural enough that there should be growing concern in England, North-west Europe, and the United States of America about the quantity and quality of the population. These countries are about to be faced with the problem of trying to maintain output and living standards in spite of an ageing population, and so it is most desirable that few of the young should be passengers because of mental or physical defect. Professor Wallgren notes that the cost in Sweden of maintaining a child in an institution or reformatory is as great as the income of a labourer, on which he may support himself, his wife, and three children. In addition the methods at present available for planning family size, natural and artificial, are such that a small proportion of individuals in each social class are incapable of making effective use of them. These less-gifted individuals—their family size limited only by their natural fertility—are contributing to the next generation many children, unwanted by their parents, who have neither the good genetic endowment nor the parental affection which should so far as possible be every child's birthright.

These may be temporary phenomena and disappear if ever family planning becomes universal and the birth rate has remained steady for a couple of generations. But there is a case for a positive eugenic policy, since the total number of mutations occurring in each generation, most of them disadvantageous, is considerable. Professor Muller[4] has estimated that at least one human gamete in ten contains a new mutation. Where the disease or deformity produced by a mutation is lethal in childhood, or at any rate sufficiently serious to prevent the affected individual having children, the proportion of individuals in the population with that particular disability will reach equilibrium at twice the mutation rate for dominant genes and once the mutation rate for completely recessive genes. In so far as a civilized society is successful, by medical and social aid, in keeping such affected individuals alive and enabling them to rear an average-size family the proportion of affected individuals in the population will rise. If by a new treatment nine-tenths of a group of children with a formerly lethal genetically determined disability are made fully fit and have the average number of children, then the proportion of the population with that particular disability and needing the treatment will reach nearly 10 times the previous level. In the long run this process, operating over a wide field of physical and mental disorders, would put an intolerable burden

[1] *Arch. Dis. Childh.*, 1951, **26**, 97.
[2] *British Medical Journal*, 1951, **1**, 1260.
[3] *New York Times*, May 20, 1951.
[4] *Amer. J. hum. Gen.*, 1950, **2**, 111.
[5] *The Biology of Mental Defect*, 1949, London.

on the medical and social services. When natural selection is mitigated many maintain that some kind of artificial selection through the deliberate planning of family size must be substituted.

Swedish policy is already—and English policy possibly will be—to rely both for quantity and quality of population on family planning by well-informed and responsible parents conscious of the issues at stake when they decide how many children they will have. In both countries public opinion is against any attempt to keep up the numbers of unwanted children by making access to information of contraceptive methods difficult. This policy will probably work after an initial period of anxiety about quantity, since most of the children who grow up in families which are happy, united, and large by design are likely to repeat the pattern themselves—if they can afford to. It is reasonable to hope that the numbers of men and women in the population with serious diseases and deformities determined by dominant genes will be kept near the lower limit set by the mutation rate. An affected parent is perhaps the best judge whether his disability is one that he would wish to transmit to children. On the other hand, any real reduction in the frequency of recessively determined conditions of a serious nature will come only when it is possible to recognize the apparently normal heterozygous carriers; it appears that this will in many cases be possible, since only a few genes are truly recessive in the sense that they have no effect at all on the heterozygote. Probably every one of us is heterozygous for some disadvantageous genes, and when they are all recognizable it will be reasonable for those who carry more than the average number to plan a family at below replacement level—say, two children—and for those who are lucky enough to carry very few to plan at above replacement level—say, five children. With qualities which are mostly determined by numerous genes of small effect—intelligence above the level of imbecility probably falls into this group—rapid progress in raising the average of the population towards the level of the present-day best would be achieved by voluntary differential fertility of this kind, unless, as Professor Penrose has suggested without much direct evidence, the intelligent have a low fertility.

In countries with population policies of this kind legal sterilization will play only a small part, and the indications will be medical and social more often than eugenic. Some argue that to make voluntary legal sterilization available with proper safeguards in this country would be an extension of human liberty. While contraceptive methods are still not altogether reliable, men and women who may in all probability have seriously affected children often wish to be sterilized. Any doctor at the moment performing sterilization on these grounds, rather than in the interest of the individual's own health, is perhaps liable to prosecution: the obscurity of the legal position was discussed in the report of the Departmental Committee on Sterilization published in 1934. Sterilization, voluntary in principle, is also carried out extensively in Sweden (and many other countries) on high-grade feeble-minded men and women before they leave institutions. Such individuals are often able, with some supervision, to maintain themselves in society but would be incapable of giving their children a satisfactory upbringing, quite apart from the fact that the majority of their children would be well below the average in intellectual potential. Professor Wallgren argues that it is inhuman to keep high-grade feeble-minded persons in institutions when the only bar to their release, the danger that they might have children, can be overcome by sterilization. Only time will show what the effect of this policy will be on the incidence of mental defect. In the Colchester survey Professor Penrose[5] found that about a quarter of the parents of the border-line or feeble-minded children were "border-line" or "feeble-minded" themselves. Perhaps it would be reasonable to expect a 10% reduction in the incidence of feeble-mindedness in each generation (though not of idiocy or imbecility) if all the feeble-minded who were not in institutions were sterilized. This is by no means insignificant, but is small compared with the reduction that would come about if "dull and backward" individuals voluntarily limited their families to two children.

THE MEDRESCO HEARING-AID

A physicist (Dr. T. S. Littler), an otologist (Mr. J. H. Otty), and a social scientist (Mr. P. G. Gray) gave their views on the development and use of the Medresco hearing-aid at the Festival Scientific Meeting (symposium on oto-rhino-laryngology) held on June 6. Dr. Littler, who is secretary of the M.R.C.'s Electro-Acoustics Committee, which was responsible for the design of the Medresco hearing-aid, gave an account of the evolution of the scheme to provide a national hearing-aid from its inception in 1944 to the publication of the committee's report[1] in 1947. The committee found that a valve aid with air conduction receiver and giving even amplification for speech would meet the requirements of most deaf people. Such an aid was designed and in a series of pilot trials it proved to be satisfactory, comparing favourably with other hearing-aids then available. Since the original design three improved models had been produced, and, according to Dr. Littler, with continuing developments in the performance and battery consumption of hearing-aids further improvements in the Medresco aid might be expected, not the least important of which would be a reduction in the size and weight of the batteries. Mr. Otty, as the otologist in charge of a busy hearing-aid distributing centre at Bradford, had found the Medresco aid of help in all but a very small proportion of applicants. In particular he had found that three-quarters of the children at a deaf school were helped by and were now actually using Medresco aids. A great problem was the long waiting-list, which at the present rate of issue meant a wait of at least three years. To keep pace with the increasing waiting-list the Bradford centre, without increasing present staff or

1 *Spec. Rep. Ser. med. Res. Coun., Lond.*, No. 261.

accommodation, could distribute at least a third more aids than at present. Mr. Gray, of the Social Survey Division of the Central Office of Information, gave some of the results of an inquiry among patients who had been issued with Medresco hearing-aids. Over one thousand were selected at random from those attending distribution centres throughout the country and visited in their homes by trained interviewers. Of the patients with aids at the time of the inquiry, 95% claimed to be using them; in fact they had worn them on an average for almost five hours a day during the previous week. With the help of the Medresco aid 91% said that they could understand all or most of what was said to them. As many as 50% of users came from households where the income of the head of the family was £5 a week or less, and it would have been a real hardship for the majority to have had to find the money for the purchase and maintenance of an aid. The main criticism made by patients was of the weight and size of the batteries. When asked at the end of the interview for their general comments on the aid and the service, more than half the patients were enthusiastic and 83% approved. The survey suggests that the Medresco hearing-aid is making a very real contribution to the welfare and happiness of deaf people in this country.

POST-MATURITY

Medico-legal implications apart, post-maturity is a condition which is regarded seriously by some obstetricians and lightly by others. This diversity of outlook was reflected in the discussion on the subject[1] at last year's Annual Meeting in Liverpool. In this issue of the *Journal* the problem is raised once more by Dr. Douglas Latto, who points out that, whatever view is taken, the decision to induce labour in any individual case should rest on something more substantial than the duration of pregnancy as estimated from the reported date of last menstruation. Not only may the patient's memory be actually or conveniently unreliable, but in addition post-maturity may be apparent rather than real in women with longer than average menstrual cycles. Lengthening of the pre-ovulatory phase in such women means that conception does not take place about the fourteenth day after the first day of the last period, which is the basic assumption in the standard method of estimating the expected date of confinement. Further, post-maturity may tend to recur in successive pregnancies in the same women, or in different members of the same family, without untoward effect. Yet when these factors have been discounted and the fact recognized that post-maturity of the foetus and prolongation of the pregnancy are not necessarily synonymous, true post-maturity does sometimes present a difficult clinical problem. Dr. Latto takes the view that it resolves itself largely into the proper management of malpresentations and minor degrees of disproportion, but this is contrary to the general experience. Hamilton[1] and McKiddie[2] have shown that in the practice of two different teaching maternity hospitals the overall foetal loss rises significantly with the prolongation of pregnancy beyond term, and it is difficult to believe with Dr. Latto that this is largely because of failure to diagnose disproportion. One common clinical observation is that the post-mature foetus has a poor resistance to anoxia and becomes easily distressed during labour. This may be because the efficiency of the maternal uterine circulation becomes impaired and the oxygen saturation of the foetal blood is diminished after term, or perhaps because the foetus outgrows the efficiency of its own placenta. While therefore agreeing with Dr. Latto that each case must be considered individually and routine induction avoided, many obstetricians will continue to be worried when the confinement becomes overdue by dates and the foetus is found to be large and rather rigid, with relatively little liquor in the uterus—the physical signs of post-maturity emphasized by Wrigley.[3] Moreover, in such circumstances there is every need to be alert for evidence of foetal distress in the ensuing labour, whether it be spontaneous or induced.

[1] *British Medical Journal*, 1950, **2**, 281.
[2] *J. Obstet. Gynaec. Brit. Emp.*, 1949, **56**, 386.
[3] *Proc. roy. Soc. Med.*, 1946, **39**, 569.

SALARIES OF HOSPITAL BOARD OFFICERS

Negotiations on salaries of headquarters medical officers employed by regional hospital boards have been the subject of arbitration after the two sides of Whitley Committee B had failed to reach agreement. The arbitration was carried out by the Industrial Court, and its award, together with the evidence and other information put before it, is set out in the *Supplement* at p. 244. The doctors whose claims have been negotiated are senior administrative medical officers, deputy senior administrative medical officers, and regional psychiatrists.

The S.A.M.O.s and the regional psychiatrists are paid on scales that vary from region to region. The present salaries of S.A.M.O.s vary from £1,750 in the Scottish northern region to £2,500 in certain large regions in England and Scotland, with intermediate figures for other regions. The award classifies the salary scales by the same groups of regions, and makes the present salaries minima for scales in which annual increments are added. The figure of £1,750 is now the bottom of a scale rising to £2,250 per annum by annual increments of £100, while the highest salary scale now rises from £2,500 to £3,250 a year by annual increments of £150. The top salaries of the scales in the other regions are now £3,000, £2,750, and £2,475.

The original salaries had been fixed in 1947, but it was then accepted that they would be looked at again in the light of the Spens recommendations for consultants, which were not then known, and other relevant salaries. The evidence given before the Court emphasized that S.A.M.O.s "are entitled to full parity of status with the average consultant and to broadly equal pay," for they must organize and control many consultants and command their respect.

The present scale of deputy S.A.M.O.s is £1,550 rising to £1,750 a year by annual increments of £50, plus a weighting of £50 in the Metropolitan area. The Industrial Court has classified the salaries awarded by regions,

the minimum salary varying from £1,550 a year to £1,650 and the maximum from £2,050 to £2,150. The regional psychiatrists have had the maxima of their present scales increased. Again the scales vary from region to region, the minimum in this case from £1,800 to £2,000. The award retains the same minima, but increases the maxima to vary between £2,425 and £2,625 according to region instead of the present £2,100 and £2,300.

The senior administrative medical officers have obtained what they asked for with the exception of those in the Eastern and North-eastern regions of Scotland, who are placed on a slightly lower scale. The court has clearly accepted the contention that the salaries of S.A.M.O.s should be broadly equal to those of the average consultant. The deputies have not done quite so well, though they have obtained some increase on their present salaries and especially on their maximum salaries. The psychiatrists also obtained something between what they now receive and what they asked for. In general the Court's award is a compromise, favouring most the S.A.M.O.s. It awards higher pay to the medical officers engaged in what has been an important feature of Health Service organization. A less satisfactory feature of the award is that the salaries are payable only from October 1, 1950. Since the salaries were fixed only provisionally in the first place, it would surely have been more just to take that into account and make the award retrospective to July 5, 1948.

TRAINING HOSPITAL ADMINISTRATORS

The King Edward's Hospital Fund for London has established a staff college for the training of hospital administrators.[1] It began in April a four weeks' refresher course which was undoubtedly a success. The great advantage of such a course is that men with different experience in hospital administration meet together and, in addition to lectures, have free discussions of their common problems. Group discussions of this kind never fail to be stimulating, and those attending them part all the more readily with set ideas of what is right or wrong in hospital administration. The King Edward's Fund is planning long courses on a two-year basis, but it is not yet ready to put them into effect. It is intended that nine months of this course should be spent in residence in the staff college.

At a reception last week the Minister of Health promised his support to the fund in this work and commended its action in concentrating on short refresher courses for existing administrators and on long courses for younger students who would be the administrators of the future. He hoped that the boards and committees in the four Metropolitan regions would take full advantage of the opportunities afforded, and said that, if any management committee was faced with financial difficulties in releasing an officer on full pay for the long course, his officers would be ready to take this up with the regional board concerned. It is good to see the King's Fund turning its experienced, voluntary hand to this particular job.

[1] The address of the staff college is 2, Palace Court, Bayswater, W.2.

CLOSED SHOP AT DURHAM

According to information reaching the B.M.A. the Durham County Council is continuing its "closed-shop" policy for public health medical officers and also refusing to implement the award of the Industrial Court, and the Secretary has immediately communicated with the council. Since it has advertised in a newspaper vacancies for three assistant school medical officers and one assistant school medical officer to act as anaesthetist, an "Important Notice" appears in our advertisement pages this week warning medical practitioners not to apply without first communicating with the Secretary of the B.M.A. The threat to limit the freedom of doctors to belong or not to belong to any organization is one that the B.M.A. will strenuously resist. As we made plain[1] when this controversy began, though membership of the B.M.A. is regarded as fulfilling the local authority's requirement, it is essential to preserve free institutions and the freedom they have to criticize without fear central or local official bodies.

Though the closed shop is ostensibly imposed in order to facilitate negotiations between employers and employed, and to ensure that both sides stick to an argeement, a remarkable feature of the Durham policy is that it refuses to abide by a decision reached by arbitration between representatives of the medical profession and the local authorities. Not content with appearing to violate the expressed wishes of the Government on whether or not employees should be forced to belong to a professional association, the majority on the Durham council is rashly trying to discredit the machinery for negotiating salaries through the Whitley Council. The continuance of Durham's policy can lead only to the depletion of its public health services, to the jeopardy of its people's health, and to a bad relationship between an authority and its employees. The attempts of committees at Durham to influence policy this way and that, the "pressure" that has been brought to bear at various meetings,[2] the uneasy silences—all combine to make a most unpleasant chapter in the history of local government. In any case the threat is bound to fail, for no Government could allow the public health service to be treated in this way. The B.M.A. will watch the course of events closely and take any action necessary to preserve the liberties that are an essential feature of our profession.

FESTIVAL LECTURE

The Festival Scientific Meetings jointly organized by the British Medical Association and the Royal Society of Medicine will continue throughout this month. On Wednesday, June 20, Sir Henry Dale will deliver the Festival Lecture in the Great Hall, B.M.A. House, at 6.30 p.m. His subject is "Medicine Yesterday and To-morrow." Lord Webb-Johnson will preside. The lecture is open to the public as well as to the medical profession, and admission will be by ticket, for which application should be made to the Public Relations Officer, B.M.A. House.

[1] *British Medical Journal*, 1950, 2, 1210.
[2] Ibid., 1951, 1, 805.

REFRESHER COURSE FOR GENERAL PRACTITIONERS

TREATMENT OF COMMON ACUTE INFECTIONS OF THE FINGERS AND HAND

BY

R. S. PILCHER, M.S., F.R.C.S.

Professor of Surgery and Director of Surgical Unit, University College Hospital

This article starts from the premise that general practitioners treat and will continue to treat acute infections of the fingers and hand. Antibiotics have so simplified the treatment of these infections that it is now seldom necessary, although it may be convenient, for a practitioner to refer such cases to hospital, and whatever contrary opinion may be held it is likely that the general practitioner will continue to have the best opportunity of starting treatment early and thereby avoiding operation.

The methods here described have been devised for the practitioner working single-handed. No claim is made for their superiority to other methods, but their efficiency and safety have been proved by trial in thousands of cases in a hospital clinic. The three principles underlying the treatment are:

(1) Control of infection by antibiotics, in particular the prevention of local spread, lymphangitis, and septicaemia.

(2) The limitation of surgery to small incisions for the evacuation of pus and slough.

(3) The use of rest during the diffuse stage of infection only.

The margin of safety provided by antibiotics does not justify any complacency about treatment, and there is still scope for the saving of time in healing and restoration of function, though the old dangers to life and limb have been largely eliminated. This generalization is valid only for the common infections due to penicillin-sensitive Gram-positive cocci. The risk of serious complication still exists in the occasional case in which the infection is resistant to antibiotics, and such cases should be referred for special investigation as quickly as possible.

Most infections of the hand and fingers involve only the skin and subcutaneous tissue, and are due to *Staphylococcus aureus* usually inoculated by minor trauma. Infections of tendon sheaths and joints have become less common as complications of subcutaneous infection, but they still occur, especially if these structures are involved in the initiating trauma. The joints are particularly at risk in knuckle injuries and the tendon sheaths in pricks of the volar flexion creases. The treatment of these complications is not described here and is best carried out in hospital.

Sites of Infection

The cutaneous and subcutaneous infections comprise the following: (1) paronychia; (2) pulp infection of the terminal segment; (3) volar infection of the proximal and middle segments; (4) interdigital web infection; and (5) carbuncles of the back of the fingers and hand.

Infection is diffuse at first, but under treatment, and sometimes without treatment, it will localize and form an abscess. In some cases, particularly if antibiotics are given early, resolution may occur without abscess formation. This should be the aim of treatment with antibiotics, but success can be expected only if treatment is begun within twenty-four hours of the onset of pain, and at present most patients wait longer than this before seeking treatment.

The depth at which infection occurs has a most important bearing on treatment, but in only one group—paronychia—can one be reasonably sure of the depth when the patient is first seen. Paronychia is a subcuticular infection and pus forms under the horny layer of the deep aspect of the lateral or basal folds of skin over the edge of the nail. From here it may spread under the nail itself or on to the superficial aspect of the folds. Pus is usually present when the patient first seeks treatment even if none is visible, and its early release from the nail fold can prevent its spread beneath the nail.

Infection in any of the other groups may have as one of its manifestations subcuticular pus, and this is the only site in which pus can be recognized with certainty and ease by inspection. The subcuticular purulent blister is obvious, but it may be connected by a hole in the skin with a subcutaneous abscess, and a careful search must always be made for this when a purulent blister is opened. It has been suggested that no harm results from waiting in all cases until visible pus forms in the subcuticular layer; while this may be true if antibiotic cover is given, time may be saved by anticipating its formation, particularly in paronychia. In individuals with a soft skin and a thin horny layer escape of pus into this layer easily decompresses a subcutaneous abscess, and pain is thereby relieved. If, however, the horny layer is hard and thick it does not yield readily, and it may retain pus under tension, with corresponding prolongation of pain. The commonest cause of delay in healing after an abscess is opened is the presence of adherent slough, and it seems that slough separates more readily when it is bathed in pus. However, when an abscess is seen there is no means of telling whether it contains adherent slough. The question can be answered only by opening and inspecting it.

Always Use an Antibiotic

At whatever stage the infection is seen antibiotics should be the first part of treatment. No exception to this rule is allowed even if the abscess is ripe. Operation should not be done until the patient has an antibiotic in his circulation. At present penicillin is the most useful agent, and if used in one of the slow-acting preparations a daily dose of 300,000 units is adequate in most cases (see below). If operation is intended at the first visit 250,000 units of a watery solution of penicillin may be injected for a rapid effect half an hour before the operation. It is better to delay the operation for a few hours than to operate without antibiotic cover.

In cases of spreading infection with lymphangitis and severe constitutional signs larger doses of penicillin should be given at more frequent intervals—for example,

500,000 units four-hourly—and when the infection is localizing the daily 300,000 units of slow-acting penicillin can be substituted. For such cases rest is also necessary, and the best way to ensure it is a plaster splint moulded to the hand and forearm on the aspect opposite to the lesion. If fever, tachycardia, and malaise are present the patient should rest in bed until the antibiotic takes effect. If there is much swelling of the hand it should be elevated on pillows, or suspended if there is anything convenient, such as a picture rail, to which to hitch it. Penicillin should be continued until local as well as general signs of infection have subsided, but splint and sling can be discarded when the infection is well localized.

Pain is a conspicuous feature of all hand infections, particularly those of the pulp of the distal segment. Although some relief may be given by the antibiotic, anodynes should be prescribed, particularly when operation is deferred. Tab. codein. co. in doses of 10–15 gr. (0.65–1g.) are adequate for most cases, but repeated doses may be needed

Operation should not be undertaken until the infection is localized, the hand being rested until this occurs. Pus may be manifested by a subcuticular purulent blister or, when subcutaneous, by localized tenderness persisting after the diffuse reaction has subsided. An apparent exception is paronychia, when pus, though not visible, may be expected at the first inspection. In paronychia the infection is superficial, a diffuse reaction is rare, and there is no objection to early intervention.

Local Analgesia

For simplicity and single-handed work local analgesia is recommended for all cases. Its superiority over general anaesthesia is merely a matter of convenience, and no objection is offered to general anaesthesia if preferred by patient or doctor, provided that it is of adequate duration. Operations under nitrous oxide are often associated with haste and this must be avoided. The digital nerves are easily blocked with local analgesics at the base of the finger, but for palmar infections nerve block at the wrist is required. Both blocks are easy, but many practitioners may prefer to use general anaesthesia instead of the wrist block, which requires more time and care than the digital nerve block.

All operations should be done in a bloodless field. For the fingers a piece of rubber tube clipped with a haemostat round the base of the finger is adequate, and this is applied before the nerves are blocked. For a digital nerve block a subcutaneous injection of 1 ml. of 2% procaine *without adrenaline* is made on each side of the digit distal to the tourniquet. Analgesia takes 10 minutes to develop. For the wrist block 2 ml. of procaine is injected round the median nerve, 2 ml. round the ulnar nerve, and 2 ml. across the dorsum of the wrist for the branches of the radial nerve. A sphygmomanometer cuff on the arm makes an efficient tourniquet for all lesions proximal to the digits. Some patients find this very uncomfortable, and if adrenaline is added to the procaine the tourniquet need not be applied until analgesia has developed in the hand, but adrenaline must never be used for digital nerve block because of the risk of gangrene resulting from the prolonged ischaemia.

If operations are done under local analgesia it is convenient for the patient and practitioner to sit on adjacent sides of a small table, the patient facing the practitioner. It is advisable to have a couch available for the occasional patient who "comes over queer." If the operations are done under general anaesthesia more elaborate arrangements are necessary.

The nature of the operation will vary a little with the site of the infection, but its aim should be the evacuation of pus and slough with minimal trauma. There are no standard incisions for abscesses in the fingers and hand. Incision should be made over the abscess, and if made through the full thickness of the skin it should follow Lange's lines and should never cross flexion creases. Drains of either rubber or gauze are not necessary. If incision is made through the full thickness of skin its edges should be pared off for a width of 1–3 mm. so that the opening is slightly "saucerized." This is particularly valuable when the skin is very thick and horny. It not only improves drainage but helps to prevent the persistence of a rigid cavity after the separation of slough (see below). All of the following treatments can be carried out under nerve blocks, but whatever anaesthesia is used a bloodless field must be obtained, and for general anaesthesia the simplest tourniquet is a sphygmomanometer cuff on the arm.

Equipment and Technique

The following instruments and materials are needed: syringes and needles for penicillin injections and nerve blocks; scalpel with small blade (Bard–Parker No. 11 is suitable); nail scissors; fine pointed scissors; fine dissecting forceps, toothed and untoothed; probe (a Watson Cheyne dissector is adequate and is useful for raising nail folds); artery forceps for clipping finger tourniquet; fine rubber tubing for tourniquet; heavy dissecting forceps for handling sterile instruments; dry gauze dressings; finger bandages; 3-in. (7.6-cm.) plaster-of-Paris bandages; slings; procaine, 2% solution in ampoules; penicillin, aqueous solution; penicillin, slow-acting preparation; penicillin lactose powder (2,000 units of calcium penicillin per gramme of sterile lactose); cetrimide.

If the practitioner sees enough cases to make it worth while, instruments can be sterilized by boiling at the beginning of the day and kept ready for use in a dry sterile box with a lid. If the operation is done with dry washed hands and the instruments are carefully handled it is possible to maintain a "no touch" technique and sterile rubber gloves are not necessary. However, it is advisable for the operator to wear gloves to prevent the contamination of his own hands, as the victim of a hand infection is likely to be a skin carrier of *Staph. aureus*. Gloves used for this protection need not be sterile. They can be put on dry and then washed with soap and water or with cetrimide and dried.

Treatment

Paronychia.—As has been stated, pus is usually present when the patient is first seen, and it is subcuticular. Unless he is seen within twenty-four hours of the onset of pain paronychia should be explored at the first visit. To find the pus the nail fold is separated by blunt dissection from the nail, a start being made at the site of maximum tenderness. This manœuvre will release the pus and after this has been mopped away the nail must be carefully examined to see if pus has tracked beneath it. If it has, the undermined area of nail is excised but adherent healthy nail is left. An incision into the nail fold is not necessary. Any cuticle that has been elevated by pus is carefully snipped away. Subsequently the nail folds must be carefully inspected daily and care

taken to prevent premature adherence to the nail, which may cause pocketing of pus and result in further spread under the nail. Occasionally a lateral pulp infection produces a subcuticular component beside the nail. Careful inspection of the abscess in paronychia will reveal the track to the deep component when it is present.

Pulp Infection.—(*a*) *Subcuticular purulent blister*: The blister is completely unroofed by snipping away the raised cuticle. The floor is mopped dry and inspected for a track into the pulp. If found, its extent and direction are measured by probing, and the opening is then enlarged in the appropriate direction. Probing should include a deliberate search for bare bone. (*b*) *No subcuticular blister but pus diagnosed by localized tenderness*: Incision is made over the site of maximum tenderness and when pus is found it is mopped away and the abscess explored with a probe. The incision is then enlarged, if necessary, in the appropriate direction and, as in the previous case, a search is made for bare bone. The abscess is also inspected for the presence of slough, which must be removed if loose, but its excision is not recommended.

Volar Infection of Proximal and Middle Segments.—These are dealt with as pulp infections. It must be remembered that in the flexion creases there is little fat, and the skin approximates closely to the tendon sheath.

Web Infection.—In the early stage this is manifest by swelling of the adjacent fingers and of the back of the hand and also some separation of the fingers. As in other parts of the hand abscess may be detected by the formation of a subcuticular purulent blister or localized tenderness after the diffuse infection has begun to subside. Incisions are made carefully through skin only and enlarged according to the direction of spread as shown by probing. The most generally useful incision for these infections is one in the overlying flexion crease at the base of the finger.

Carbuncles.—Subcuticular purulent blisters, usually multiple, are a feature of carbuncle, but the chief cause of trouble in these infections is slough. There need be no hurry to open the blisters, as little good will be done until the slough is loose and can be removed. Incisions are not necessary in most cases, but sometimes a large slough can be extracted only after enlarging the spontaneous opening in the skin.

Dressings and Aftercare

Dry gauze dressings are recommended for all cases, and the patient is instructed not to remove the dressing or to get it wet. The dressing is changed daily until the wound is healing. In paronychia it has been found useful to introduce a little penicillin lactose powder under the elevated nail folds, and in pulp infection with bare bone a little of the powder is packed into the depth of the wound. Paronychia after the formation of pus has ceased requires no dressing unless the nail has been removed, and for early cases without removal of any nail frequent washing with soap and water is recommended after operation.

Persistence of much swelling is an indication for continued splinting and elevation of the limb. Troublesome swelling is commonest in web infections and carbuncles, the swelling being mainly on the back of the hand and fingers. As soon as the signs of infection have subsided, particularly pain and swelling, movement and use of the finger are to be encouraged. If the patient is having antibiotic treatment there appears to be no risk of recurrence of the diffuse stage of the infection. In most cases healing is rapid after pus has been evacuated and slough removed. The commonest cause of delay in healing is the persistence of adherent slough. At the daily dressing the wound must be inspected for slough, which is pulled out when loose. Other possible causes are bone infection, joint infection, and the presence of foreign bodies. Delay in healing also occurs in cases in which a large slough has separated slowly, leaving a cavity which has had time to become somewhat rigid. If there is any doubt about the cause of delay the finger can be *x*-rayed for bone changes or opaque foreign body. But a careful exploration of the wound under ring block and tourniquet is more likely to provide the answer.

A film entitled *The Treatment of Infections of the Hand*, which was made at the Hand Clinic of University College Hospital, is included in the B.M.A. Film Library and is available on request.

A LIST OF MEDICAL MUSEUMS OF GREAT BRITAIN (1949-50)

BY

C. J. HACKETT, M.D.

Secretary, British Section, International Association of Medical Museums; Director, Wellcome Museum of Medical Science

At the annual general meeting of the British Section of the International Association of Medical Museums in London on December 30, 1948, with Professor Matthew J. Stewart in the chair, it was proposed that a survey of medical museums of Great Britain should be initiated. Copies of a questionary were circulated to members of the association in February, 1949. Additional copies were more widely distributed later in that year, and attempts were made to get further replies in 1950. Returns were obtained from 41 museums in London, 23 in the Provinces, 20 in Scotland, 2 in Wales, and 4 in Ireland. Of these, 5 in London and 4 in the Provinces were either under construction or were exclusively for the use of students of the parent organization, and no details were submitted. There were thus returns from 81 museums for study. Although considerable efforts were made to communicate with all medical museums by inquiry from directors of museums returning the completed questionaries and by reference to directories, it is not certain that all museums were approached. It would be appreciated if the directors of any such museums would write to the Secretary of the British Section of the International Association of Medical Museums, at 183, Euston Road, London, N.W.1.

The present attempt could provide only a list of the medical museums of Great Britain. There is need for a more complete survey of such museums as indicated by Hackett (1949) comparable to that made by Markham (1938) of the smaller museums and art galleries of the British Isles. This could best be done by one individual visiting each museum.

The questionary was headed by this paragraph: "Purpose of Survey: The preparation of a list of medical museums to facilitate visits and interchange of ideas by students and workers in medical museums." Inquiries were made in 20 sections on the following points: Name and address of museum, director and staff; type of museum; type of user for whom museum was planned; size and general scheme of museum;

contents of museum (i.e., specimens, illustrations, diagrams, charts, models, etc.); system of classification and identification of specimens; source of specimens; availability of microscopical preparations, microscopes, and reference library; facilities for study; accommodation for research work; facilities for training of technicians; if regular demonstrations were given in the museum; method of lighting; methods of preservation and mounting; particular strength of museum; annual number of visitors; and by whom the museum was financed. Inquiries were also made for other museums in the area. A second brief questionary was sent out in 1950 asking if the museum was open to all medical graduates and undergraduates without or with permission of the director of the museum, or if the museum was available only to students of the parent body.

Before listing the museums under the above geographical divisions, certain items may be summarized. There were very few full-time directors; the museum duties of most directors were a small part of their activities, which included teaching, routine investigations, research, or other work related to their department or appointment.

Replies to a Questionary

Over half the museums were said to have been planned for undergraduate and postgraduate students and, in a small number, also for nurses, or were intended for undergraduates and nurses or postgraduates only. The replies to the second questionary showed that over half the museums were accessible only to medical graduates or undergraduates after seeking permission from the director or other person in authority (e.g., dean), while about a quarter were available to these groups without previous permission. A small number were available only to the students of the institutions concerned. Although where permission is necessary it is usually readily granted, there are some teaching hospitals where entrance to their medical museums is barred to all except their chosen few. This may be necessary to protect their own students from the rush of outsiders, who might otherwise monopolize the material, but it seems out of step with the possibility that Britain should become a major centre for postgraduate medical teaching. The lack of an attendant in the museum should not be a hindrance to a more liberal policy, since any technician or graduate on the staff occasionally visiting the museum could, at a glance, identify and warn off any "stranger." A notice on the door indicating the categories for whom the museum is available would probably do much to reduce the possibility of unwanted visitors.

The floor space of over a quarter of the museums was less than 1,000 sq. ft. (92.9 m.²), of over a half it was less than 2,000 sq. ft. (185.8 m.²), and in only 8 was it over 5,000 sq. ft. (464.5 m.²).

The most usual arrangement of material was in shelves, cases, cupboards, etc., and in only about a quarter of the museums were bays made use of to increase available display area.

In over three-quarters of the museums it was reported that illustrations, etc., or models, or both, were employed. In over half the museums specimens were classified by anatomical, organ, disease, or aetiological subdivisions; in the remainder their own, the decimal, or Maude Abbott's classifications were used in about equal numbers. Most replies expressed mild satisfaction with the system in use. The most usual methods of describing specimens were loose-leaf books or labels. Card indices were used in a few, and in fewer still bound volumes of notes were employed.

At over half the museums microscopes were available, as were microscopical preparations. In about half the museums regular demonstrations were given to classes of students attending the university, medical school, etc.; in about a further quarter such demonstrations were occasional. In over two-thirds of the replies it was stated that a reference library, facilities for study, accommodation for a limited number of research workers, and facilities for training technicians were available, but, except for the second, these probably applied more to the institution with which the museum was associated than to the museum. In very few museums was daylight the only source of light; in most it was assisted by fluorescent lamps, filament lamps, or by both in about equal numbers.

In most museums Kaiserling's method or some modification of it was used to preserve gross specimens. In a few the sodium hydrosulphite method (Wentworth, 1947) was in use. Although in about a third of museums glass jars alone were employed, in nearly a half both glass and "perspex" (methyl methacrylate) containers were in use, and in most of the others perspex only was used. About half the museums were considered by their directors to contain material worthy of visits by interested persons outside the museum area. In returns from 71 museums the date of foundation was given; 4 were founded in the eighteenth century, 29 in the nineteenth, and the remainder were equally divided between the first and second 25 years of the present century.

Alphabetical List

The following is an alphabetical list of 36 museums in London, 19 in the English Provinces, 20 in Scotland, and 2 each in Wales, Northern Ireland, and Eire. Those museums open to medical graduates and undergraduates without previous permission are indicated by an asterisk. The figures in brackets after each museum are the date of founding of the museum and the area of its floor space.

London

Central Histological Laboratory, Whittington Hospital, Archway Wing, N.19	Pathological (1933; 1,600 sq. ft., 148.6 m.²)
Chelsea Hospital for Women, Dovehouse Street, S.W.3	Pathological—of female generative system. (1930; 800 sq. ft., 74.3 m.²)
*Guy's Hospital Medical School, Gordon Museum, S.E.1	Pathological, anatomical, dermatological, and dental, with some historical material relating only to Guy's Hospital. (1905; 14,700 sq. ft., 1,365.7 m.²)
Hospital for Sick Children, Great Ormond Street, W.C.1	Pathological, historical. (1853; 1,200 sq. ft., 111.5 m.²)
Institute for Diseases of the Chest, Brompton Hospital, Brompton Road, S.W.3	Pathological and radiological of diseases of the chest. (1880; 800 sq. ft., 74.3 m.²)
Institute of Laryngology and Otology, 330, Gray's Inn Road, W.C.1	Pathological (ear, nose, and throat) with some clinical and surgical material. (1946; 1,200 sq. ft., 111.4 m.²)
*Institute of Ophthalmology, Judd Street, W.C.1	Pathological. (1857; 350 sq. ft., 32.5 m.²)
Institute of Orthopaedics, Royal National Orthopaedic Hospital, 234, Great Portland Street, W.1	Pathological, clinical, and surgical (orthopaedic)
Institute of Psychiatry, Maudsley Hospital, Denmark Hill, S.E.5	1. Pathology of central nervous system. 2. Guttmann-Maclay Collection. Art in mental disorder and allied bibliographia. (1951; 300 sq. ft., 27.9 m.²)

London.—cont.

London Hospital Medical College Museum, Turner Street, Mile End, E.1	Pathological, clinical, surgical, dental, parasitological, anatomical, pharmaceutical, preventive medicine, and industrial medicine. (1854; 7,200 sq. ft., 668.9 m.²)
National Heart Hospital, Westmoreland Street, W.1	Pathological. (1930; 300 sq. ft., 27.9 m.²)
National Hospital for Diseases of the Nervous System, Queen Square, W.C.1	Pathological. (1920; —)
North Middlesex Hospital, Silver Street, Edmonton, N.18	Pathological, clinical, surgical, gynaecological, and anatomical. (1947; 360 sq. ft., 33.4 m.²)
Postgraduate Medical School of London, Hammersmith Hospital, Ducane Road, W.12	Pathological. (1935; 800 sq. ft., 74.3 m.²)
*Prince of Wales's General Hospital, Tottenham, N.15	Pathological. (—; 200 sq. ft., 18.6 m.²)
Queen Charlotte's Hospital, 339, Goldhawk Road, W.6	Pathological, clinical, and surgical — mostly obstetrical
Royal Army Medical College, Millbank, S.W.1	1. Pathological with tropical medicine bias. (1904; 2,000 sq. ft., 185.8 m.²) 2. Preventive medicine and hygiene with special reference to Army health. (Admission by application to Commandant R.A.M. College.) (1914; 3,000 sq. ft., 278.7 m.²)
Royal Cancer Hospital, Fulham Road, S.W.3	Pathological. (1898; 360 sq. ft., 33.4 m.²)
*Royal College of Surgeons, Lincoln's Inn Fields, W.C.2	Anatomical (including odontological) and pathological. (1800; 7,700 sq. ft., 715.3 m.²)
Royal Free Hospital School of Medicine, 8, Hunter Street, Brunswick Square, W.C.1	1. Anatomical. 2. Pathological. (1879; 1,100 sq. ft., 102.2 m.²)
*Royal Sanitary Institute, Parkes Museum of Hygiene, 90, Buckingham Palace Road, S.W.1	Hygiene. (1876; 2,700 sq. ft., 250.8 m.²)
St. Bartholomew's Hospital Medical College, West Smithfield, E.C.1	Pathological. (1726; 2.800 sq. ft., 260.1 m.²)
St. George's Hospital Medical School, Hyde Park Corner, S.W.1	Pathological. (1835; 1,200 sq. ft., 111.4 m.²)
*St. Mark's Hospital, City Road, E.C.1	Pathological (diseases of rectum). (1926; —)
St. Mary's Hospital Medical School, Paddington, W.2	Pathological. (1855; 900 sq. ft., 83.6 m.²)
*St. Peter's Hospital for Stone, 10, Henrietta Street, Covent Garden, W.C.1	Pathological (urological). (1930; —)
St. Thomas's Hospital Medical School, The Shattock Museum, S.E.1	Pathological, clinical, medical, and surgical. (1847; 2,700 sq. ft., 250.8 m.²)
University College Hospital Medical School, Gower Street, W.C.1	1. Anatomical. (New Museum 1946; 1,070 sq. ft., 99.4 m.²) 2. Morbid anatomy and historical relating to U.C.H. (1907; 2,600 sq. ft., 241.5 m.²)
*Wellcome Historical Medical Museum, 28, Portman Square, W.1	Historical. (1913; 2,300 sq. ft., 213.7 m.²)
*Wellcome Museum of Medical Science, 183–193, Euston Road, N.W.1	Medical sciences. (1912; 4,500 sq. ft., 418 m.²)
West End Hospital for Nervous Diseases, Welbeck Street, W.1	Pathological (neurological). (1920; —)
Westminster Hospital Medical School, 17, Horseferry Road, S.W.1	Primarily pathological, with morbid anatomical specimens illustrating clinical medicine and surgery. (1849; 1,600 sq. ft., 148.6 m.²)

Provinces

Birmingham

Birmingham Medical School, Birmingham, 15	Pathological, clinical, surgical, dental, anatomical, and anthropological. (1938; 7,200 sq. ft., 668.9 m.²)

Bristol

Pathological Museum, University of Bristol	Pathological. (1826; 2,300 sq. ft., 213.7 m.²)

Cambridge

Anatomy School, University of Cambridge	Anatomical and anthropological. (1804; 4,050 sq. ft., 376.3 m.²)
*Humphry Museum, Department of Pathology, Tennis Court Road, Cambridge	Pathological. (1891; 1,150 sq. ft., 106.8 m.²)

Leeds

St. James's Hospital, Leeds, 9	Pathological, clinical, and surgical. (1929; 360 sq. ft., 33.4 m.²)
University of Leeds, School of Medicine, Leeds, 2	*1. Anatomical. (1887; —) 2. Pathological, including all specialties. (1904; 6,340 sq. ft., 589 m.²) 3. Forensic medicine. (1947; —)

Liverpool

*Department of Pathology, University of Liverpool	Pathological. (1844; 1,300 sq. ft., 120.1 m.²)
*University of Liverpool, 126, Mount Pleasant, Liverpool, 4	Preventive medicine and historical. (1897; 5,700 sq. ft., 529.6 m.²)

Manchester

Anatomy Department, Manchester	Anatomical, with small historical and dental sections. (1874; 3,000 sq. ft., 278.7 m.²)
Department of Pathology, York Place, Manchester, 13	Pathological. (1927; 1,800 sq. ft., 167.2 m.²)

Newcastle-upon-Tyne

Dental Museum, Sutherland Dental School, King's College, Newcastle-upon-Tyne, 1	Dental (pathological, clinical, anatomical — human and comparative—and historical). (1895; 1,900 sq. ft., 176.5 m.²)
*Pathological Museum, Medical School, King's College, Newcastle-upon-Tyne, 1	At present pathological, but it is intended to make it a general medical museum. (1840; 2,200 sq. ft., 204.4 m.²)
*Pathological Museum, Royal Victoria Infirmary	Pathological. (1948; 800 sq. ft., 74.3 m.²)

Oxford

Pathological Museum of Oxford University, Radcliffe Infirmary	Pathological. (1900; 1,000 sq. ft., 92.9 m.²)

Sheffield

Sheffield Royal Infirmary	Pathological (medical and surgical) with essential parasites or organs of parasitological interest. (1934; 100 sq. ft., 9.3 m.²)
University of Sheffield, Sheffield, 10	1. Anatomical. (1905; 550 sq. ft., 51.1 m.²) 2. Pathological. (About 1900; 1,080 sq. ft., 100.3 m.²)

Scotland

Aberdeen

University of Aberdeen, Marischal College, Aberdeen	Anatomical and anthropological. (1860; 2,500 sq. ft., 232.2 m.²)
*University of Aberdeen, Fosterhill, Aberdeen	Pathological, clinical, and surgical. (1938; 4,600 sq. ft., 427.4 m.²)

Scotland.—cont.

Dundee

*Department of Pathology, Medical School, Dundee	Pathological. (1902; 850 sq. ft., 79 m.²)
Dundee Dental School, University of St. Andrews, Park Place, Dundee	Dental. (—; 2,200 sq. ft., 204.4 m.²)
Forensic Medicine Department, Medical School, Dundee	Forensic medicine
St. Andrews University Surgery Museum, Small's Wynd, Dundee, Angus	Surgical. (1933; 400 sq. ft., 37.2 m.²)
University College, Department of Anatomy, Dundee	Anatomical. (1887; 1,400 sq. ft., 130 m.²)

Edinburgh

*Royal College of Surgeons Museum, Royal College of Surgeons, 18, Nicolson Street, Edinburgh, 8	Primarily surgical pathology with dental, ophthalmological, anatomical, and historical sections (1804; 7,800 sq. ft., 724.6 m.²)
University of Edinburgh, University New Buildings, Teviot Place, Edinburgh	*1. Anatomical, including considerable collections of comparative anatomy, and lesser ones of pathology. (1798; 6,000 sq. ft., 557.4 m.²) 2. Forensic medicine, largely pathological. (—; 1,500 sq. ft., 139.4 m.²) 3. Materia medica. (Early 19th century; —) 4. Surgical pathology. (1924; 600 sq. ft., 55.7 m.²)
*Usher Institute, Harrenden Park Road, Edinburgh, 9	Public health and industrial medicine. (1902; —)

Glasgow

Department of Anatomy, University of Glasgow, Glasgow, W.2	Anatomical and pathological. (1783; 3,000 sq. ft., 278.7 m.²)
Glasgow Royal Infirmary, Glasgow, C.4	Pathological. (1908; 2,400 sq. ft., 223 m.²)
Glasgow Royal Maternity and Women's Hospital, Rottenrow, Glasgow, C.4	Pathological and clinical. (1908; 700 sq. ft., 65 m.²)
Institute of Pathology, Royal Hospital for Sick Children, Yorkhill, Glasgow, C.3	Pathological. (1924; 1,300 sq. ft., 120.8 m.²)
Mearnskirk Hospital Museum, Newton Mearns, Glasgow	Pathological. (1930; 400 sq. ft., 37.2 m.²)
Western Infirmary, Glasgow	Pathological. (1870; 1,600 sq. ft., 148.6 m.²)

St. Andrews

Bute Anatomical Museum, Bute Medical Buildings, St. Andrews	Anatomical. (1899; 1,000 sq. ft., 92.9 m.²)

Wales

Cardiff

University College, The Alfred Hughes Museum, Department of Anatomy, Newport Road, Cardiff	Anatomical. (1900; 500 sq. ft., 46.5 m.²)
Welsh National School of Medicine, Royal Infirmary, Cardiff	Pathological. (1916; 1,750 sq. ft., 162.6 m.²)

Northern Ireland

Belfast

*The Queen's University, Belfast	1. Anatomical and clinical. (1860; 4,400 sq. ft., 408.8 m.²) 2. Pathological. (1935; 1,800 sq. ft., 167.2 m.²)

Eire

Dublin

Trinity College, Dublin	1. Anatomical. (1889; 1,600 sq. ft., 148.6 m.²) 2. Pathological. (1898; 900 sq. ft., 83.6 m.²)

Replies to a questionary were received from 81 medical museums in Great Britain. A brief summary of these returns and a list of the museums has been made. There is need for a more complete survey of them, based upon the visits of one or at most only a few observers.

REFERENCES

Hackett, C. J. (1949). *Bull. int. Ass. med. Mus.*, **30**, 114.
Markham, S. F. (1938). *A Report on the Museums and Art Galleries of the British Isles (other than the National Museums)*. Constable, Edinburgh.
Wentworth, J. E. (1947). *Bull. int. Ass. med. Mus.*, **27**, 201.

MEDICAL BIRTHDAY HONOURS

The names of the following members of the medical profession were included in a Birthday Honours List published in *Supplements* to the *London Gazette* on June 7:

K.C.V.O.

GEOFFREY SYDNEY TODD, C.V.O., O.B.E., M.B., Ch.M., F.R.C.P. Medical Superintendent, King Edward VII Sanatorium, Midhurst, Sussex.

D.B.E. (Civil Division)

HILDA NORA LLOYD, M.B., Ch.B., F.R.C.S. President of the Royal College of Obstetricians and Gynaecologists. Professor of Obstetrics and Gynaecology in the University of Birmingham from 1944 to 1950.

Knighthood

CHARLES ARTHUR LOVATT EVANS, D.Sc., Hon.LL.D., F.R.C.P., F.R.S. Emeritus Professor of Physiology in the University of London.

ERNEST FREDERICK FINCH, M.D., M.S., F.R.C.S. Professor of Surgery in the University of Sheffield from 1934 to 1944; Vice-President of the Royal College of Surgeons of England. For services to surgery and medical education.

JOHN WILLIAM MCNEE, D.S.O., D.Sc., M.D., F.R.C.P., F.R.C.P.Ed., F.R.F.P.S. Regius Professor of the Practice of Medicine in the University of Glasgow since 1936; Physician to H.M. Household in Scotland; Consulting Physician to the Royal Navy in Scotland.

PHILIP SANTO MESSENT, M.S., F.R.A.C.S. Director of Surgical Studies, University of Adelaide, South Australia.

C.B. (Military Division)

JOHN MANDEVILLE MACFIE, C.B.E., M.C., M.B., Ch.B. Major-General, late R.A.M.C. Honorary Surgeon to the King.

C.M.G.

JOHN MERRILL CRUICKSHANK, O.B.E., M.D., F.A.C.P., F.A.C.S., Colonial Medical Service. Director of Medical Services, Fiji, and Inspector-General, South Pacific Health Service.

JOHN WILLIAM FIELD, M.D., Colonial Medical Service. Director of the Institute for Medical Research, Federation of Malaya.

HERBERT JOHN SEDDON, D.M., F.R.C.S. Member of the Colonial Advisory Medical Committee; Clinical Director of the Royal National Orthopaedic Hospital; Nuffield Professor of Orthopaedic Surgery in the University of Oxford and Clinical Director of the Wingfield-Morris Hospital from 1940 to 1948.

C.V.O.

ALEXANDER GREIG ANDERSON, M.D., F.R.C.P. Physician to H.M. Household in Scotland; Consulting Physician, Aberdeen Royal Infirmary.

GEORGE RITCHIE MATHER CORDINER, M.B., Ch.B., D.M.R.E. Honorary Radiologist, St. George's Hospital, London.

C.B.E. (Military Division)

WILLIAM EDWARD BARNES, M.R.C.S., L.R.C.P., D.T.M.&H., Air Vice-Marshal, R.A.F.

WILLIAM ALEXANDER DUNCAN DRUMMOND, O.B.E., F.R.C.S., D.L.O. Colonel, late R.A.M.C.

C.B.E. (Civil Division)

THOMAS BEATON, O.B.E., M.D., F.R.C.P. Physician-Superintendent, St. James Hospital, Milton, Portsmouth, and Medical Director, Mental Health Service, Portsmouth.

EDMUND CECIL BEVERS, B.M., B.Ch., F.R.C.S., F.R.C.S.Ed. Lately Chairman, United Oxford Hospitals.

EUSTACE HENRY TAYLOR CUMMINGS, M.B.E., M.D., D.P.H., D.P.M. For Services to the Municipality of Freetown, Sierra Leone.

EVAN STANLEY EVANS, M.B., B.S., F.R.C.S., Chairman, Queen Elizabeth Training College for the Disabled, Leatherhead, Surrey.

TIANG KENG LEE, M.B., Ch.B. Member for Health, Federation of Malaya.

JOSEPH STANLEY MITCHELL, Ph.D., M.B., B.Chir., D.M.R., Professor of Radiotherapeutics in the University of Cambridge.

MATTHEW JOHN STEWART, Hon.LL.D., M.B., Ch.B., F.R.C.P., F.R.F.P.S., Emeritus Professor of Pathology in the University of Leeds.

EDWIN LAWRANCE STURDEE, O.B.E., M.R.C.S., L.R.C.P., D.P.H., Principal Medical Officer, Ministry of Health.

JAMES MATHEWSON WEBSTER, M.D., F.R.C.S.Ed., Director, Home Office West Midland Forensic Science Laboratory, Birmingham.

O.B.E. (Military Division)

WILLIAM MACFARLANE DAVIDSON, M.B., B.Ch., Acting Interim Surgeon Commander, R.N.

DEREK GEORGE LEVIS, M.B., B.Chir., Lieutenant-Colonel, R.A.M.C.

ANGUS JOHN MACIVER, M.B., Ch.B., Lieutenant-Colonel, R.A.M.C., T.A.

O.B.E. (Civil Division)

WILLIAM BLOOD, M.R.C.S., L.R.C.P., D.I.H., Chairman, Brook Green Disablement Advisory Committee.

ARTHUR JOSEPH BOASE, M.R.C.S., L.R.C.P., Colonial Medical Service. Ophthalmologist, Uganda.

ELIZABETH CASSON, M.D., D.P.M. Founder and Medical Director of the Dorset House School of Occupational Therapy, Churchill Hospital, Headington, Oxford.

GERALD SAMUEL WILLIAM DE SARAM, M.B., B.S., lately Judicial Medical Officer, Colombo, Ceylon.

JAMES LESLIE MCLETCHIE, M.B., Ch.B., D.T.M.&H., Colonial Medical Service. Senior Medical Officer in charge of Sleeping Sickness Service, Nigeria.

GEORGE MARANGOS, Honorary Consulting Surgeon at Limassol Hospital, Cyprus.

JOHN PERCY TRUELOVE MUSSON, M.B., Ch.B., Deputy Director-General of Medical Services, Ministry of Pensions.

LENA FRANCES GORDON PRIESTMAN, M.B., B.S., Medical Officer, Molai Leper Colony, Nigeria.

HENRY DOUGLAS WEATHERHEAD, M.R.C.S., L.R.C.P., D.T.M.&H., lately Director of Medical Services, North Borneo.

HARRY MONTEFIORE WILSON, M.B., B.Chir., F.R.A.C.S., Medical Practitioner, Hawkes Bay, New Zealand.

M.B.E. (Military Division)

RICHARD SWINTON HUNT, M.R.C.S., L.R.C.P., Major, R.A.M.C.

M.B.E. (Civil Division)

MRS. MARGARET MERRY BROTHERSTON, M.B., Ch.B., D.P.H., Organizing Secretary and Honorary Treasurer, Voluntary Health Workers' Association, Edinburgh.

ELIZABETH CATHERINE GUNN, M.B., Ch.B., a former Director of the School of Hygiene, Wellington, New Zealand. For public services.

NINIAN GEORGE TROTTER, M.D. For public and social welfare services in New Zealand.

JOHN RICHARD WILSON, M.D., Visiting Physician, Tuberculosis Hospital, Welisara, and Consultant to the Chest Hospital, Ragama, Ceylon.

Honorary M.B.E. (Civil Division)

ABDUL LATIF bin ABDUL RAZAK, L.M.S., Medical Officer, Federation of Malaya.

The Nurses and Midwives Whitley Council has decided to grant a service allowance of £15 at the end of six months' service to trained nurses who are engaged in full-time nursing of tuberculosis during the year starting June 1, 1951. This is to be an experiment which will operate for one year only, and will be reviewed by the council towards the end of the period. Under the existing arrangements tuberculosis nurses qualify for an allowance of £30 after one year's service.

Reports of Societies

FESTIVAL SYMPOSIUM ON ANTIBIOTICS

On June 7 a symposium on "Antibiotics" was held at 1, Wimpole Street, London, W.1. This was the fourth of the Festival scientific meetings sponsored jointly by the British Medical Association and the Royal Society of Medicine.

The Chairman, Sir ALEXANDER FLEMING, opened the symposium by paying tribute to the work of Sir Howard Florey and his colleagues at Oxford whose researches into the pharmacology and purification of penicillin had established it as a therapeutic substance. It had been the stimulus of war which had led to production on a massive scale and the refinements in production technique which made penicillin readily available to-day.

Since the early days the attitude to dosage of penicillin had altered completely, due largely to its abundance and to the development of delayed-absorption preparations, such as procaine penicillin. The disadvantage of the latter was that blood levels were correspondingly lower and for this reason it was often preferable to use repeated injections of sodium salt.

With the discovery of the newer antibiotics, the field of chemotherapeutics had been greatly widened. The tubercle bacillus had been shown to be susceptible to streptomycin, and in chloramphenicol they had an antibiotic which could be synthesized.

Professor Sir HOWARD FLOREY said that although the initial scientific and clinical work on penicillin had been done in this country the discovery and exploitation in the clinic of other antibiotics had mostly occurred in the U.S.A. Nevertheless work on antibiotics continued in this country and the outlook here had been considerably improved by the acquisition by the Medical Research Council of an Antibiotics Research Station where materials were produced for further investigation elsewhere.

Antibiotics from Bacteria

He described work done by a number of colleagues in the Sir William Dunn School of Pathology and the Department of Botany, Oxford. Investigations there and elsewhere had shown that at least 23 species of penicillia and 9 of aspergilli produced substances indistinguishable from penicillin. But no substance, other than penicillin, produced by penicillia or aspergilli had so far been found to be suitable for use in medicine. There were over 30,000 species of the basidiomycetes, each of which might have individual strains varying in their capacity to produce antibiotics. This showed how large was the field awaiting investigation.

"Bacitracin" had been found to contain 3 polypeptide fractions with powerful antibiotic activity; two had been highly purified but found, if used systemically, to produce severe kidney lesions. These fractions were valuable when used locally, but had no secure place in chemotherapy owing to their toxicity. In 1946 a micrococcus recovered from sewage had been found to produce an antagonistic substance, micrococcin; this had subsequently been obtained as a crystalline substance of low solubility but active in a dilution of 1 in 30,000,000 against streptococci. It was also active against the tubercle bacillus, though unfortunately much less so. Strains of *Bacterium coli* produced antibiotics which were active almost exclusively against other coliform organisms. They were destroyed by proteolytic enzymes. *Staphylococcus aureus* had also been found to produce an antibiotic substance of protein nature.

Another antibiotic, cephalosporin, had been isolated from an organism recovered from the sea near a sewage effluent off the coast of Sardinia and came from a group of organisms hitherto not found to produce antibiotics. Five fractions of this antibiotic (P 1–5) had now been isolated, and

cephalosporin P 1 was nearly in the chemotherapeutic class. It was about half as toxic as "aureomycin" and "terramycin" when given intravenously and was absorbed from the alimentary tract. For some unknown reason it was much less effective in experimental infections in mice than would be expected from its activity *in vitro*.

This difference between the activity *in vitro* of an antibiotic and its effect *in vivo* had been a cause of much speculation. Experimental work on rabbits with a leucopenia following subcutaneous injections of benzol had shown that infection with pneumococci in such animals was overcome by penicillin in the absence of leucocytic emigration into the tissues.

Stability and Purity of Antibiotics

Dr. E. P. ABRAHAM took up the chemical aspect of antibiotics and showed the very great importance of the chemist in the future of antibiotic research.

The ease of isolation of an antibiotic depended on a number of its properties. One of them was its stability, for a stable antibiotic could often be easily purified by procedures that would inactivate a highly labile one. Many different factors were known to affect the stability of antibiotics. For example, the antibiotic from *Staph. aureus* was inactivated by an air–water interface induced by rapid shaking of a solution. The quadrifidins were stable when dissolved in water or ether, but in the dry crystalline state they rapidly polymerized and lost activity. In some cases traces of impurities in water or organic solvents, such as heavy metals, could bring about inactivation. Penicillin, micrococcin, and bacitracin, for instance, were inactivated by copper ions. Enzymes might also inactivate antibiotics. The various colicines and bacilysin were readily inactivated by common proteolytic enzymes. Cephalosporin P 1 was inactivated by a preparation of penicillinase obtained from a strain of *Bacillus cereus*, but this had been found to be due not to the penicillinase itself but to an enzyme that accompanied it.

The crystalline state was no guarantee of purity, at least with antibiotics of complicated structure such as the polypeptides. Crystalline gramicidin, for example, contained more than one compound. The purification of antibiotics by modern methods had shown that what was formerly believed to be a single substance might really be a mixture of several constituents. Thus, bacitracin had been found to consist of three clearly defined active components. A given strain of bacteria might give rise to a whole series of polypeptide antibiotics, all of which might be very closely related in chemical composition and which appeared to be formed by minor variations of a common biosynthetic process.

Although very few of the antibiotics that had been isolated had any use in the clinic, many of them were of considerable chemical and physiological interest. The study of the polypeptide antibiotics from bacteria, for example, might be expected to add to our knowledge of the structure of the proteins. In the long run these academic investigations might also be of direct value to medicine.

Commercial Production

Dr. E. LESTER SMITH, in describing the large-scale production of antibiotics, paid tribute to the anonymous teams of scientists and industrialists from whose efforts the whole of the now abundant supply of penicillin and other antibiotics had resulted. Penicillin was being produced at a rate of over 200 tons per annum, while streptomycin was manufactured at a rate of 40 tons per annum in 1948, only four years after its discovery. The initial yield of penicillin was now more than ten times what it had been in the early days of commercial production. The main problems in the manufacture of penicillin had been, first, the teaching of bacteriological technique to untrained personnel; and, secondly, the construction of apparatus and the devising of methods for growing *Penicillium* in deep culture for several days, which would allow thorough aeration and yet maintain complete freedom from contamination. The purity of penicillin to-day in the crystalline form of penicillin G was vastly different from the substance prepared in the early days, which had a purity of between 10 and 20%, and the cost, originally over 20s. per mega unit, was now 5s. 6d. per mega unit.

The chemical modification of the molecular structure of antibiotics had been attempted but neither penicillin G nor chloramphenicol had been improved upon.

Development of Resistance

Professor L. P. GARROD brought a note of caution and some gloomy prognostication about the future of the antibiotics at present in use. Acquired resistance was the most important single limiting factor with an antibiotic; much argument was going on whether this was the result of mutation or adaptation. For a genetic alteration in characteristics to occur a sexual conjugation would appear to be necessary; since bacteria multiplied by simple fission, the transmission of an acquired character seemed possible. Mutation was nevertheless a factor; minute numbers of cells in a bacterial population never before exposed to streptomycin could be shown to be many times more resistant than the main mass, and it was these cells which came to the fore when an infection with such an organism became resistant to streptomycin. The capacity for *in vitro* habituation of organisms to penicillin varied considerably; the resistance of the meningococcus to penicillin could be increased half-a-millionfold, that of the gonococcus about a thousandfold, that of the pneumococcus only slightly, and the resistance of the haemolytic streptococcus Group A could hardly be increased at all. Group B streptococci could be habituated to a greater extent than Group A to penicillin, and the resistance of *Staph. aureus* could be increased up to 350,000 times. These high degrees of laboratory resistance had no counterpart in the clinical field except in the case of *Staph. aureus*, and it had been clearly shown that the increase in penicillin-resistant strains encountered was simply due to a selection of originally resistant penicillinase-producing staphylococci as a result of the wide use of the drug.

Streptomycin-resistance could develop in nearly all organisms within 20 generations, and the drug would have a diminishing usefulness in the future; probably the only organisms that would continue to be amenable to treatment by streptomycin would be those causing diseases conveyed from animals to man, such as plague and tularaemia. Resistance of moderate degree to chloramphenicol, aureomycin, and terramycin could develop both *in vitro* and *in vivo*, and when it occurred it embraced all three drugs to some extent.

If no new powerful antibiotics were discovered, the probable future position with the commoner pathogenic bacteria would be that the meningococcus would probably still be well under control, likewise the gonococcus and the haemolytic streptococcus. Staphylococci and the intestinal group of organisms on the other hand might gradually become less and less amenable to attack by the resources at our disposal.

Clinical Trials

Professor CLIFFORD WILSON said that the evaluation of antibiotic therapy demanded the closest co-operation between clinicians and bacteriologists. In diseases with a well-defined course, particularly those of serious prognosis, clinical trials of a new antibiotic could be carried out by a number of investigators in different centres working to a common plan. This method had proved of value in therapeutic trials of penicillin in subacute bacterial endocarditis and of streptomycin in *Haemophilus influenzae* meningitis and in tracheo-bronchial and urinary-tract tuberculosis. Where, however, the natural course of the disease was uncertain, a rigidly controlled trial was essential, with random selection of cases and statistical assessment of results by independent observers. Such a trial had provided

a critical and accurate assessment of streptomycin therapy in pulmonary tuberculosis. With new antibiotics appearing in rapid succession, carefully planned comparative trials were necessary. To this end, groups of investigators were trying out aureomycin, chloramphenicol, and terramycin in pneumonia, whooping-cough, and infantile gastro-enteritis. Until the results were established, a great responsibility lay on the clinician to use these drugs with discrimination.

Antibiotics and Venereal Disease

Dr. G. L. M. McELLIGOTT outlined the great advances in the treatment of venereal diseases resulting from the discovery of antibiotics. Undoubtedly penicillin was wonderfully effective in the treatment of syphilis, signs of resistance in the spirochaete not having yet appeared. In this country many venereologists had been loath to forsake entirely the use of arsenic and bismuth, which were still often given in addition to penicillin. The speaker had, however, decided to abandon arsenicals in the autumn of 1947 and up to the present had had no cause to regret his decision. A follow-up of cases treated with penicillin plus arsenic plus bismuth, and penicillin plus bismuth alone, had so far shown no appreciable difference in results. The end of the arsenical era would appear to be at hand.

The fact that results seemed to be better now than they were three or four years ago was due mainly to a fast diminishing reservoir of infectious syphilis; many so-called relapses in the early days of penicillin had been, in fact, reinfections. The use of procaine penicillin in oil with aluminium monostearate (P.A.M.) had greatly facilitated the treatment of syphilis, and he had become increasingly convinced that a single injection of from 600,000 to 900,000 units of P.A.M. was far more active therapeutically than a full dose of any arsenical compound and, what was perhaps equally important, it could do no harm. Another very great advantage of penicillin was that with it the patient was made non-infectious before his lesions had had time to heal, which greatly lessened the social risk.

In neurosyphilis there was a sustained improvement in the cerebrospinal fluid, and clinical improvement was more rapid than after the older methods of treatment. There had been a remarkable fall in the reported deaths from G.P.I. and tabes during the last three years but no such improvement in those from aortic aneurysm. Cardiovascular syphilis was rarely recognized until irreparable damage had been done. This pointed to a need for earlier diagnosis rather than better treatment. The value of penicillin in the prevention and treatment of congenital syphilis was well established.

Acute gonorrhoea could usually be cured by a single injection of 150,000 units of P.A.M. A tablet of 250,000 units of penicillin by mouth could prevent the disease, but one disadvantage of this procedure was that the contact might not be discovered and treated. Streptomycin was effective against gonorrhoea and had the advantage of not masking concurrent syphilis. It was also useful in chancroid and non-gonococcal urethritis, and was outstandingly valuable in granuloma inguinale. Aureomycin, chloramphenicol, and terramycin formed an expensive strategic reserve against gonorrhoea and syphilis, and their use was not at present indicated, except in the treatment of resistant cases of non-gonococcal urethritis.

Control of Infectious Diseases

Professor ROBERT CRUICKSHANK said that the principal applications of antibiotics in infectious disease were in the treatment of the clinical condition and, by eliminating the causative organism, in the control of the spread of infection. In scarlet fever and streptococcal sore throat sulphonamides were not effective in the control of the clinical condition nor in preventing the spread of infection, whereas penicillin, given for 5–6 days, was of value from both points of view. Penicillin was similarly effective in puerperal sepsis and in diphtheria. In typhoid fever, chloramphenicol, though of great value clinically, was not effective in the elimination of the organism, and this might be because chloramphenicol was more bacteriostatic than bactericidal.

The prophylaxis of infectious disease could be accomplished by the use of antibiotics. A controlled trial with penicillin, 100,000 units orally once a day, in children convalescent from acute rheumatism had shown that in the streptococcal carriage rate, the development of streptococcal sore throat, and the recurrence of rheumatism the controls receiving no oral penicillin were four to five times worse off than those receiving penicillin. He was sure that there was a field for the combined use of two chemotherapeutic drugs which might act differently on the infecting organism.

The combination of streptomycin and P.A.S. in the treatment of pulmonary tuberculosis resulted in the more rapid elimination of the organism and largely prevented the development of resistance to streptomycin. The effect of antibiotics on the immunological responses of the body was a matter of some concern. The relapse rate in typhoid fever treated with chloramphenicol was now between 25 and 30%, compared with the earlier incidence of 5–10%. There appeared to be no deficiency in demonstrable antibody, but the use of either antityphoid serum or small frequent doses of T.A.B. vaccine with chloramphenicol was being tried in some centres. Alternatively a second course of the drug could be given after an interval of 10 days, when the relapse usually occurred. Similar methods were being used in undulant fever.

Sir ALEXANDER FLEMING summarized the symposium and mentioned that nothing had been said of the remarkable growth-stimulating capacity of penicillin and other antibiotics, and he brought the meeting to a close in a lighter vein with a slide showing a big and a little turkey of the same age, the former having been fed on a diet containing penicillin.

ADRENOCORTICOTROPHIC HORMONE

On May 23 a symposium on A.C.T.H. was held jointly by the Section of Endocrinology of the Royal Society of Medicine and the Society for Endocrinology at the House of the Royal Society of Medicine. A large audience heard a series of critical papers, given by experts in their own particular corners of what has now become a vast, many-sided field. No one at this memorable meeting could have failed to be impressed by the bewildering complexity of this essentially very new subject.

Are there Several Corticotrophic Hormones?

The opening paper, by Professor F. G. YOUNG and Dr. M. STACK-DUNNE, discussed two problems relating to the properties of A.C.T.H. The first of these, on the question of whether more than one corticotrophic hormone is produced by the anterior lobe of the pituitary gland, took us back to the early experiments of Phillip Smith, who first showed how hypophysectomy in rats caused degenerative changes in the adrenal cortex which could be prevented or reversed by implants of fresh pituitary glands. The authors' own experiments have led to the definite conclusion that the factor which causes depletion of ascorbic acid in the adrenal cortex of the hypophysectomized rat—that is, the factor assayed by the well-known Sayers test for A.C.T.H.—is not the same as that which will maintain the weight and histological structure of the adrenal cortex in similar test animals. Indeed, in different hormone preparations the differences between these two effects might be several thousandfold. Growth hormone, for example, was found to be rich in the weight-maintenance factor but poor in the ascorbic-acid-depleting factor. There was no reason to suppose that growth hormone itself was the weight-maintaining factor. The suggestion was made that the weight-maintaining factor might promote the accumulation of cholesterol or of other precursors of cortical steroids, while the ascorbic-acid-depleting factor was involved in the release of the newly formed hormones. The second question discussed by Professor Young was the relation of the active peptide described

by Li to the now well-known protein of molecular weight 20,000. He stated that Dr. Stanford Moore, in his laboratory, had found that by using an ion-exchange column A.C.T.H. could be separated into a major fraction almost devoid of ascorbic-acid-depleting activity and a minor fraction which was a basic substance (probably a peptide) and highly active in depleting cortical ascorbic acid. It was supposed that, in the gland, this fraction was associated with the slightly acidic protein fraction which acted as a carrier.

Dr. C. J. O. R. MORRIS, in discussion, said that results obtained in his laboratory were in entire agreement with those of Professor Young. Both weight-maintaining and ascorbic-acid-depleting factors were ultrafilterable. Some of the Armour A.C.T.H. preparations he had tested were devoid of weight-maintaining factor.

Clinical Urinalysis Unreliable

Professor G. F. MARRIAN discussed some of the deficiencies in the methods at present in use for assaying urinary metabolites of cortical hormones. Three main methods were in current use for determining the substances obtained by chloroform extraction of the urine either with or without preliminary acid treatment—viz., biological assay, depending upon the deposition of glycogen in the livers of adrenalectomized mice, the reduction of copper or molybdate solutions, and the liberation of formaldehyde from periodic acid. Clearly, chemical methods would measure many substances not detected by biological assay, and, moreover, substances such as those with α-glycol side chains would react with periodic acid but would not necessarily, like those with α-ketol side chains, cause reduction. No systematic study of the effects of preliminary acid hydrolysis had been made, but Dr. Patterson, in his laboratory, had found very complicated relationships which led to the conclusion that, apart from the presence of free steroids which were acid-labile, there were two types of conjugated formaldehydogenic steroids present in urine, one chloroform extractable and rapidly hydrolysed at *p*H 1 and then rapidly destroyed at this *p*H (these were probably not glucuronides); and the other not extractable by chloroform even in acid solution, but slowly hydrolysed at *p*H 1, yielding free acid-stable and acid-labile compounds. There were also objections to methods of hydrolysis employing glucuronidases, although by their aid the yield of formaldehydogenic substances could be increased 10 to 30 times. No satisfactory methods were yet available and great doubt attached to the significance of the results obtained. Other problems related to the need for better methods of extraction and to the fact that there were good reasons for believing that urine contained adrenocortical metabolites not determined by any existing method. There were, for example, several 21-deoxy steroids which had been isolated from urine and which might well be important metabolites of cortical hormones, but no methods were yet available for measuring them. In short, Professor Marrian doubted whether the fact that present methods seem to have some value in clinical investigation justified their use in the face of such grave drawbacks, and he urged those employing them to devote some of their energies to improving them and making them more reliable.

Metabolic and Tissue Responses to A.C.T.H. and Cortisone

Professor G. R. CAMERON, whose subject was tissue reactions to A.C.T.H. and cortisone, said he felt like the Children of Israel on a memorable occasion being asked to make bricks without straw—so little was known of the subject. There seemed no doubt, however, that in man and in some animal species cortisone markedly modified inflammatory reactions, reducing oedema and lymphocytic infiltration. It was remarkable that, on cessation of treatment, the previously affected tissues relapsed, thus showing that cortisone acted not on the causal agents of disease but on the reactions of the tissues to those agents. Fibrin disappeared from healing areas, and granulation tissue, blood vessels, and fibroblasts were poorly developed under the influence of large doses of cortisone. Wounds therefore healed slowly, lymphoid tissue underwent atrophy, and, in the mouse at any rate, skin mitosis had been shown to be inhibited. The differences, however, in inflammatory reaction in treated and untreated animals were quantitative, not qualitative. Large doses also decreased the permeability of blood vessels to histamine and leucotaxins. Professor Cameron suggested that a reasonable explanation of the action of cortisone on tissues depended upon its being a surface-active substance, modifying the permeability of cell membranes. He thought this might be a good starting-point for further investigations into an explanation of the observed facts.

Dr. F. T. G. PRUNTY had found the metabolic changes in humans after administration of A.C.T.H. to be very irregular and unpredictable. Determinations of serum protein, cholesterol, uric acid, and of sodium balances had proved to be of little value in the assessment of the response from individual patients, but the output of 17-ketosteroids and formaldehydogenic steroids and the fall in circulating eosinophils gave useful information. In general, the rise in 17-ketosteroids was much less than that in formaldehydogenic steroids after A.C.T.H., and a relationship existed between the output of the latter steroids and the percentage fall in circulating eosinophils. The eosinophils usually were almost completely absent when the urinary formaldehydogenic steroid level was 4–5 mg. a day. He had found that adrenaline in repeated doses would depress the circulating eosinophils without affecting either 17-ketosteroids or formaldehydogenic steroids, and therefore suggested that the pituitary-adrenal axis was not the only factor concerned in the adrenaline-produced eosinopenia. There seemed to be little correlation between dose of A.C.T.H., period of administration, and response; this could be due to variability of response by the adrenal, of the potency of the preparation used, and of the adrenal metabolites; it might also be due to antibody formation. It was known that the potencies of preparations in humans might vary considerably, independently of their potency in animal tests. The eosinophil response, and its duration, could be potentiated by solution of the A.C.T.H. in polyvinyl pyrrolidine—but the response to this preparation shown by the formaldehydogenic steroids was rather disappointing. The rapid destruction of intramuscular A.C.T.H. was shown by the great augmentation of response when it was administered by slow intravenous infusion.

In the subsequent discussion various speakers commented upon the variability of different patients to the same batch of A.C.T.H., as well as variations in the same patient to the same batch of A.C.T.H. given at different times.

Biological Assay

After an interval for tea, a return to the fray was made with renewed vigour, as shown by the absence of any diminution in the complexity of the subjects discussed by the remaining five speakers. Dr. A. S. PARKES spoke of the technical difficulties of assaying A.C.T.H. With an intact animal almost any experimental procedure resulted in the outpouring of adrenocorticotrophic hormone from the anterior pituitary body. This difficulty could be avoided by the removal of the pituitary body from animals used for testing A.C.T.H., but the operation, for practical purposes, limited work to the rat. Criteria of response were difficult to choose, and, as Professor Young had shown, confining the test to a single criterion could be very misleading. The possibility of measuring the output of adrenal steroids in the venous effluent from the gland, after stimulation with A.C.T.H., was an attractive one. Dr. Parkes mentioned his own recent work in this field, based on the possibility of increasing the survival time of mice in closed vessels. Cortisone and A.C.T.H. were found to have the expected effect of increasing resistance to anoxia. Having

been told that A.C.T.H. might be contaminated with posterior-lobe principles, he decided to try the effect of commercial posterior-lobe extracts, and it was found that they behaved in a similar manner. However, since such extracts had been found to be quite highly active in the Sayers test (ascorbic acid depletion), the position was still uncertain, though it was still possible that a relatively simple test for A.C.T.H. activity might be based on its ability to increase resistance to anoxia in the intact animal.

Dr. J. H. KELLGREN described some effects of A.C.T.H. and cortisone on the peripheral circulation. Variable and conflicting results had been obtained in different conditions. In rheumatoid arthritis a low dose of A.C.T.H. caused a transient rise in knee blood-flow and a similar change in finger-tip skin temperature; a high dose over a longer period of time produced the same transient rise but then a profound and sustained fall of knee blood-flow and a sustained rise of skin temperature at the finger-tip. However, in a woman with initial high finger-tip heat-flow, A.C.T.H. made it fall to normal values. In a patient with Raynaud's disease the finger heat-flow was virtually unaffected by A.C.T.H. or cortisone, though subsequent cervical sympathectomy caused a great increase. He felt that no general statement of the effects of A.C.T.H. on the peripheral circulation could be made until much further work had been done.

A.C.T.H.-like Activity in Plasma Extracts

Miss D. M. V. PARROTT described the A.C.T.H.-like activity of acetone-precipitates of plasma, as shown by their ability to deplete adrenal ascorbic acid in the Sayers test. High levels of such activity had been found by Bornstein and Trewhella in plasma from patients with Cushing's syndrome or subject to stress, and low levels were found in Simmonds's disease. Technical points were discussed, and the lability of the extracts was emphasized. It seemed probable that an enzyme present in blood rapidly destroyed its A.C.T.H.-like activity. She had obtained high results in a diabetic woman with a 31-weeks pregnancy, in Cushing's syndrome, and in a case of adipose gynism. After irradiation of the pituitary the patient with Cushing's syndrome gave lower results. A very low level was obtained in a case of Simmonds's disease. Using the adrenal weight-maintenance test, she was again able to show A.C.T.H.-like activity in the plasma extracts.

Dr. MAX REISS pointed out that the incubation of A.C.T.H. with blood from many species of animal led to its rapid disappearance. This affected the determination of the A.C.T.H. content of the blood of both animals and patients, since even a short delay between the time of taking the blood and precipitating the hormone resulted in partial inactivation. In attempting to detect A.C.T.H.-activity in blood he now took it directly into acetone or freeze-dried it immediately without centrifugation. Dr. J. BORNSTEIN said that he had always centrifuged the blood at $-4°$ to $-10°$ C. immediately after collection so as to minimize the inactivation referred to by Dr. Reiss.

A.C.T.H. and the Gonads

Dr. P. M. F. BISHOP discussed some recent work which suggested an interaction of A.C.T.H. with the gonads. He was privileged to describe some as yet unpublished investigations by Drs. Prunty and Clayton on the influence of the gonads on the prevention of wound healing by A.C.T.H. It seemed that luteinizing hormone (L.H.) was involved in this effect, supplementing the action of A.C.T.H. The work of Greep and Chester Jones showed that, whereas androgens widened the transition zone in the adrenal cortex, oestrogens diminished it. Oestrogen treatment produced some effects similar to those of A.C.T.H., and it seemed possible that it actually stimulated A.C.T.H. production, while androgens might inhibit it. Similar conclusions had been reached by Selye and Stone. Wooley had found that experimental tumours and hyperplasia of the adrenal cortex could be produced by removal of the gonads in mice within the first three days of life. It was suggested that in the absence of the gonads there was increased utilization of A.C.T.H., leading to the increased production of A.C.T.H., and hence overstimulation of the adrenal cortex. It seemed possible that post-menopausal bleeding from a hyperplastic endometrium might be due to adrenocortical hyperfunction brought about in this manner.

Mr. I. E. BUSH considered the secretion of adrenal cortical steroids in relation to the pituitary gland and emphasized the rapidity with which stress evoked an outpouring of cortical steroids. Within a matter of minutes a depletion in ascorbic acid could be detected in the adrenal cortex. In rats, however, the rapid response could be inhibited by prior treatment with cortical extracts. It had been shown by Harris and de Groot that the response to stress depended upon the integrity of certain areas of the hypothalamus. The response of the adrenal cortex to A.C.T.H. was similarly very rapid. By analysing the venous effluent from the adrenal gland it was found that marked species differences existed in the proportions of the different steroids produced by the cortex. Under the conditions of the experiments these proportions did not seem to change when the rate of secretion rose with administration of A.C.T.H. There was no evidence that specific types of stress brought forth the increased secretion of specific cortical steroids. Thus, administration of potassium chloride to a dog did not evoke a disproportionate increase in the salt-retaining steroids, as might have been expected, but the usual stress response, involving all the usual steroids in their usual proportions.

The proceedings were ably summarized by Dr. C. J. O. R. MORRIS, who gave it as his opinion that the ascorbic-acid-depleting factor of A.C.T.H. was a highly active substance, not of particularly low molecular weight, adsorbed on to the now familiar protein of molecular weight 20,000.

CRIMINAL ABORTION

Dame LOUISE MCILROY took the chair at a meeting of the Medico-Legal Society on April 27, when Dr. R. D. TEARE read a paper on "The Medico-legal Significance of Death Following Abortion." He began his address with an apology that it was not as finished a product as he would have liked; it had been conceived only three months before, and he had been expecting delivery to take place in the autumn.

Dr. Teare said that the frequency of criminal abortion was much greater than was commonly realized—probably of the order of 40% of all abortions. It was known that the mortality rate of criminal abortion was high, but the morbidity rate was even higher and impossible to estimate. Nobody knew how many women had been left with chronic pelvic sepsis as the result of a criminal abortion.

The extent of the abortion service of this country was a feature not commonly appreciated. By way of example Dr. Teare described an abortion service which was organized around a palais de danse. Would-be patients made an arrangement at the palais to go to a nearby station, where they were met by a car. In the window of this car there was a letter, which not only acted as a means of identifying the car but also contained further instructions. A similar service was run in a seaside resort on Saturdays and Sundays. The gentleman who carried out the abortions charged anything from 20 to 100 guineas. *Clostridium welchii* had eventually been responsible for the abortionist's undoing, but he must evidently have been expecting the police to call, because when they did he was already over the garden wall.

Causes of Death

Of Dr. Teare's 89 cases of death following abortion most occurred between the ages of 26 and 30. Forty-five of these women were married, 44 were not. It was commonest for the pregnancies to be terminated in the third and fourth

months. More than half his cases had been "self-induced" or "criminal," and the Higginson enema syringe was the most popular instrument; Dr. Teare thought that slippery elm was beginning to go out of fashion. In the years preceding 1946 the commonest cause of death following criminal abortion was peritonitis: this accounted for some 31% of deaths in criminal cases. Thanks mainly to the new antibiotics, this figure had been reduced to 17% in the years since 1946. Many abortionists provided their patients with prophylactic sulphonamides nowadays; air embolism and haemorrhage had therefore increased relatively in incidence as causes of death.

One had to resort largely to speculation about the course of events in these cases, because it was exceptional to find witnesses—at any rate medical ones. Comparison with deaths due to air embolism in surgery or after pneumothorax refills gave some idea of the time-lag between the introduction of air into the circulation and death; in air embolism following insufflation of the Fallopian tubes death occurred in a matter of seconds. When soap-and-water was pumped into the uterus through a Higginson syringe the system was subjected to a pressure in the region of a hundred centimetres of mercury: that is to say, very much higher than that in the pelvic veins. Furthermore, the soap solution frequently contained bubbles of air because the receiving end of the syringe was often above the surface of the fluid, lying in the froth on the top.

It was a difficult matter to decide whether or not death had occurred suddenly. Blood was said to remain liquid in cases of sudden death, due to the presence in the body of fibrinolysins, their quantity being thought to vary directly with the speed of death. For those cases in which lysol or its derivatives had been used, Dr. Teare was developing a method of gauging the speed of death on the basis of the quantity of cresols present in the heart at necropsy. But that death could occur as a matter of accident in cases of this sort was illustrated by the following case history.

Mrs. X. lived in a "pre-fab." with her son aged 2. Her husband, a soldier, was stationed away from home. One morning the next-door neighbour heard the small boy crying for a long time, and she later noticed that Mrs. X.'s milk and bread were still on the doorstep. She finally "gained an entrance" and found Mrs. X. sitting on the lavatory, dead. When the police arrived she had obviously been dead some nine to twelve hours. She was fully dressed except for her knickers, and her pyjamas were found neatly folded over a chair in the living-room. An enema syringe was found lying on the sink draining-board, and beside her in the lavatory was a bowl of disinfectant fluid. At necropsy some hours later bubbles of air were found in the cerebral vessels. She was pregnant and the membranes had been stripped off the uterine wall. Froth was found in the uterus. Her husband said he knew that his wife was pregnant and that she had acquired the habit of douching when they lived in Egypt. Every preparation had been made for the child's delivery. Clearly, therefore, the abortion had been accidental.

This raised the question of how long a person could survive after air had been introduced into the circulation. Dr. Teare would say that it was something between two minutes and 10 minutes.

Haemorrhage was not a common cause of death following abortion. When it did occur it was almost always the result of self-inflicted injuries produced in an attempt to cause abortion. One of the most dramatic cases of this nature that he remembered was that of a professional woman who was married and had an interesting job. When she found herself pregnant she tried to produce abortion by means of a knitting needle, but succeeded only in inflicting very severe lacerations of the vagina, and she died of haemorrhage soon after her admission to hospital. Septicaemia and peritonitis, which were fairly frequent causes of death even now, sometimes killed as long as three weeks after the abortion. The main cause of death in many cases was *Cl. welchii*, the placental tisue and blood clot being an ideal culture medium for it. Being spore-bearers, the gas-gangrene bacilli defied many antiseptics. Patients who succumbed to *Cl. welchii* did not often reach hospital, because the illness was so fulminating, killing in a matter of 24 hours. Dr. Teare quoted one case of *Cl. oedematiens* septicaemia in which a pure growth of the organism had been recovered from the suspected abortionist's slippery elm bark.

Kidney damage was an occasional cause of death following abortion, and the pathological picture was reminiscent of that occurring in mismatched blood transfusions. One such case was that of a woman who found herself three months pregnant while her husband had been away for some six months or more. Evidently she did not share the belief—current in legal circles—in the elasticity of the period of gestation, for she sought an abortion, following which she succumbed to renal failure.

Any improvement in the death rate would depend, Dr. Teare thought, on improved medical care and—possibly more importantly—on improved housing conditions. "Unlike the victims of some murders," he said, "these women do not deserve the fate that claims them, and they die taking the secret of the process with them."

The Doctor's Duty

The two most important questions arising from the discussion which followed were whether or not dying declarations should be obtained, and whether or not a doctor should report a case of criminal abortion to the police. Dr. F. E. CAMPS felt that it was not justifiable to tell a patient she was going to die: while there was life there was hope. In any event, the cases of dying declarations which he could recall were no help, because the patients steadfastly maintained that they themselves had performed the abortion. Dr. R. W. COCKSHUT felt very strongly that the doctor's duty was to the patient, and that giving her away to the police would mean that in future patients would not come to the doctor until they were really desperate and much more seriously ill; the mortality rate would in fact rise. He thought that the situation was entirely different if the patient died, however: then the doctor should inform the police. Dr. A. R. FRENCH endorsed what Dr. Cockshut said, and made the observation that in this matter doctors and lawyers tended to find themselves in opposite camps.

In replying, Dr. TEARE said of dying declarations that they were in any case of doubtful value, because ultimately there was no patient to cross-examine. He thought there ought to be a middle way through the question of reporting cases of criminal abortion to the police; he felt inclined to liken one's feelings in the matter to the qualms one would get if one observed an epileptic patient to be driving the local bus.

BEIT MEMORIAL FELLOWSHIPS FOR MEDICAL RESEARCH

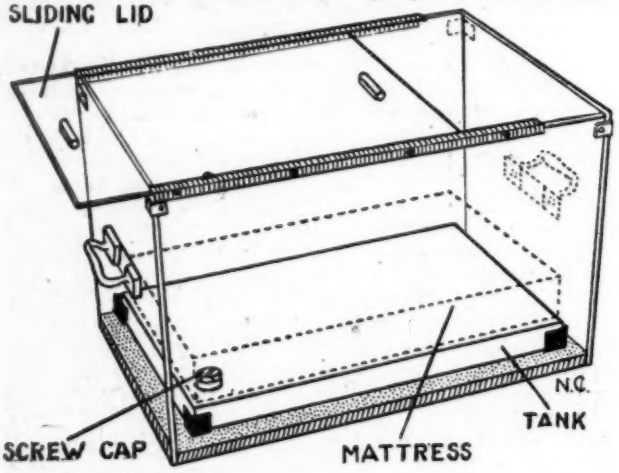
The following elections for 1950–1 have been made: *Junior Fellowships* (value £600 per year), Pamela M. Holton, M.A., D.Phil., to investigate the chemical transmission at nerve endings at the Physiological Laboratory, University of Cambridge; H. F. Jarvie, M.B., Ch.B., D.P.H., D.P.M., to study the psychological manifestations of organic nervous disease at the Department of Neurology, the Radcliffe Infirmary, Oxford; Eleanor W. McCloy, M.B., B.Ch., Dip.Bact., to study a lysogenic *Bacillus* strain at the London School of Hygiene and Tropical Medicine, London; A. F. Phillips, M.B., B.Ch., to study the mechanism of the therapeutic action of *x* and gamma rays, at the Department of Radiotherapeutics, University of Cambridge, and at the Radiotherapeutic Centre, Addenbrooke's Hospital, Cambridge; E. V. Rowsell, B.A., to study the biochemical changes associated with physiological activity in nerve tissue at the University of London Institute of Psychiatry, Maudsley Hospital, London; W. G. Spector, M.B., B.Ch., M.R.C.P., to study the mechanism of protein synthesis in premature and full-term neonates in infancy and childhood at the Graham Research Department, University College Hospital Medical School, London.

Preparations and Appliances

A PORTABLE HOT-COT FOR TRANSPORTING PREMATURE INFANTS

Dr. MARGARET B. MARTIN and Dr. ELUNED STEVEN, of Elsie Inglis Memorial Hospital, Edinburgh, write: The purpose of this article is to describe a portable hot-cot which has been developed at the Elsie Inglis Memorial Hospital for transporting premature babies born at home into hospital. Very small babies are still sent to many children's hospitals wrapped only in blankets, and many of them reach the ward too cold for resuscitation to have any effect. We feel, therefore, that the apparatus here described may prove useful for children's as well as maternity hospitals.

The accompanying drawing shows the principal features of the hot-cot. It is a rectangular box, the sides being constructed of ¼-in. (0.6-cm.) sheet "perspex" and the floor



of five-ply wood. Its overall external dimensions are 22 by 15 by 14 in. (56 by 38 by 35.5 cm.). The floor is strengthened underneath with 20-gauge sheet aluminium. The lid, which slides in a pair of metal grooves, is made of 3/16 in. (0.5 cm.) "perspex" and measures 18 by 15 in., leaving a space 4 in. (10 cm.) wide above the baby's head through which oxygen can be administered if necessary. Mounted on the floor, where it is held in position by four metal angle-pieces, is a removable tank of 18-gauge sheet copper. It has an opening at one corner fitted with a flat screw cap and washer. The mattress overlaps the tank and fits to the sides of the box snugly. The whole assembly weighs 22 lb. (10 kg.).

When a premature baby has to be brought into hospital the nursery staff fill the copper tank with boiling water, cover it with a mattress, gamgee, and blankets, and slide the lid into place to conserve the heat. The mattress and blankets are very warm by the time the house is reached. The former is then reversed, so that the warm side is next the baby, which is wrapped in a gamgee jacket, already prepared, and covered with the blankets. The lid is closed, leaving an opening of 4 by 15 in. (10 by 38 cm.), and oxygen is supplied from a portable cylinder if necessary. The air-space left when the baby is in the box is 20–30 litres. The baby is then carried, warm and without disturbance, to the car and transferred to the premature unit at the hospital. The cot can be lifted by one nurse, but when the baby is inside it is usually carried by two persons. By use of the above procedure the air temperature inside the cot can be kept at about 75° F. (23.9° C.) for several hours. If an extra hot-water bottle is added, it can be raised to 80° F. (26.6° C.).

This cot has been in use at the Elsie Inglis Memorial Hospital for the past two years, and all babies brought in have arrived warm and in a most satisfactory condition.

Correspondence

A.C.T.H., Cortisone, and Abdominal Catastrophes

SIR,—"This is at least something you won't have to go through in Great Britain." Thus spake a very distinguished American surgeon during a recent discussion in Washington on the uses of A.C.T.H. and cortisone therapy in the treatment of burns, and on its effect upon the life history of the homologous skin graft. A previous report that A.C.T.H. so modified capillary permeability that plasma loss in burns is negligible and intravenous fluid no longer necessary, and that under its influence homologous skin grafts will "take," had led to intensive publicity in the lay press, including the pictorial magazines. Research departments in more than one centre in the U.S.A. set about to confirm these exciting "discoveries," only to find that both were invalid. A.C.T.H. does not affect significantly the extent of the oedema associated with burns, nor does it obviate the need for intravenous therapy; neither cortisone nor A.C.T.H. prolongs the viability of skin homografts. The admirable work of Billingham, Krohn, and Medawar (*British Medical Journal*, May 26, p. 1157) in this country also bears on this problem. It was, however, the possible side-effects of A.C.T.H. and cortisone upon the alimentary tract which prompted the remark. Even one of the protagonists of A.C.T.H. therapy admitted that one of the burns patients so treated died from "silent," and thus undiagnosed, perforation of the duodenum, in which three holes were found at necropsy. Other examples of perforation of duodenal ulcer also came to light.

At many different centres I heard of the same or similar complications. How these are caused is not as yet known, but it has been established that A.C.T.H. increases the acid concentration and total acid output of the stomach to levels usually associated with duodenal ulceration, and that it will also increase the production of pepsin. Not only may the duodenum or other areas in the intestinal tract perforate, but the body tissues are robbed of powers of resistance to acute infection and of their ability to cry out in protest. A good example of silent perforation due to A.C.T.H. was in that of a doctor who for 20 years had suffered from chronic ulcerative colitis of moderate severity and who had refused surgical treatment. He was admitted to hospital so that he could be treated by the new wonder drug, A.C.T.H. (I gather at his own request). The diarrhoea, which was never severe, seemed to diminish, but improvement in this respect coincided with the onset of a high temperature, unassociated with localizing symptoms, which persisted and after some days became typical of that due to an abscess. A week or so after the onset of the fever *x*-ray examination showed the presence of a large left subphrenic collection, which was drained, the patient making a good recovery. This case is by no means an isolated instance of the danger of unsuspected peritoneal infection. Thus at a chance visit to the post-mortem room in one hospital I saw a necropsy on a man who had been treated in one hospital for psoriasis and during treatment had developed a very severe dermatitis. During this illness appendicitis developed, and the appendix was removed. Three days later the patient died, and the peritoneal cavity was found to be full of pus, though no perforation of bowel could be found. Presumably infection occurred during the appendix operation which normally the defence forces of the peritoneum could easily subdue.

One physician, in fact, recommended to a medical meeting that a course of antibiotics should be started routinely towards the end of a course of A.C.T.H. or cortisone.

The incitement to haemorrhage from peptic or colonic ulceration is also laid at the door of these hormones. In one centre, for example, four consecutive examples of massive bleeding had occurred during treatment of chronic ulcerative colitis by A.C.T.H., in one of which an emergency ileostomy was performed in the hope that diversion of the faecal stream would help in promoting haemostasis.

In the United States, where A.C.T.H. seems to be readily available, the task of the doctor in rationalizing the treatment of his eager patient, charged with knowledge of the wonder drug obtained from an uncritical lay press, is difficult indeed. The hold that propaganda may have upon the lay public is illustrated by a remark I overheard in the house of a surgeon. A lay acquaintance (not a patient) and her husband were being entertained. J., the husband, was taking A.C.T.H. for hyperthyroidism. "When J. takes one of these pills," said his wife, "he feels his whole biochemistry change."

My object in writing this note is not to decry or to minimize in any way the excellent laboratory and controlled clinical investigations into the properties of these remarkable substances which are now being undertaken by competent workers both in the U.S.A. and in Great Britain, but to draw attention to some of the dangers which may imperil our patients if and when A.C.T.H. and cortisone become available for general use, so that the American surgeon's remark may prove to be, as I hope it will, an accurate prophecy.—I am, etc.,

King's College Hospital, London. HAROLD EDWARDS.

Syphilis in Different Races

SIR,—I should like to comment on and add to the statements made in answer to a question on this subject in "Any Questions?" (April 21, p. 897). Your answer begins, "In the American negro, as compared with the white races, pustular and annular lesions (precocious tertiarism) and generalized adenitis are much more frequently observed during the secondary phase of the disease." I do not think there is any justification for speaking of annular secondary lesions as signs of precocious tertiarism. They are not gummatous, and *Sp. pallida* can easily be demonstrated in serum from moist lesions or from dry lesions after scraping. The term precocious tertiarism implies the appearance of genuine tertiary lesions of the skin or other organs earlier than is normally expected—i.e., under three or four years from the start of the infection. Precocious tertiary lesions usually occur in certain cases where inadequate treatment of early syphilis seems to accelerate the march of the disease.

Annular secondary and recurrent secondary lesions are as common in the African native as in the American negro. Residual pigmentation is often seen after healing of secondary lesions on a white skin. The black skin frequently shows the opposite effect, a transitory diminution of pigmentation. An odd syphilitic condition peculiar to South African natives, and in particular to Bechuanas, is witkop, or whitehead (see *S. Afr. med. J.*, 1949, **23**, 783). This has never, to my knowledge, been discovered in any other race.

Epitrochlear adenitis, noted as significant in the diagnosis of secondary syphilis in the European, is not significant in the South African native, as it is found in a large percentage of non-syphilitics. Visceral syphilis of all kinds certainly does occur in the South African native and is not very uncommon. Neurosyphilis has been stated to be rare in certain races, Chinese, North Africans, etc. The statement is accepted and passed without examination from one textbook to the next (I have sinned in this respect in the past). In fact, neurosyphilis exists in these races and can be found if it is looked for. The races in question are neither long-lived nor over-doctored, so that the reason for earlier misapprehension is obvious. I no longer believe in Kraft-Ebing's dictum that neurosyphilis requires civilization as well as syphilization.—I am, etc.,

Johannesburg. JAMES MARSHALL.

Epidemic Vertigo

SIR,—In the last two months I have seen three patients, aged 54, 39, and 9, struck down by the following syndrome: the acute onset of severe giddiness, followed rapidly by nausea, and in the two adult cases severe vomiting, associated with headache, generalized aches in the limbs, and slight fever.

On examination in all cases an obvious coarse horizontal nystagmus was elicited on looking to either side. No other physical signs in the central nervous system were observed. The giddiness was not present while lying down flat, but became incapacitating on sitting up or standing. In all cases the nausea and vomiting were rapidly relieved by an antihistaminic, promethazine 8-chlorotheophyllinate, in appropriate dosage, but this did not affect the vertigo.

The first case seen two months ago still has fine nystagmus on extreme deviation and vertigo on stooping, but is otherwise well. The second case is improving steadily after three weeks, and the third is still in the acute stage.

In view of recent reports I have little doubt that these are cases of epidemic vertigo, or "neurolabyrinthitis epidemica" (see *British Medical Journal*, 1950, **2**, 1493). In an exactly similar case seen in Winchmore Hill, London, in 1948, the patient was referred to a leading neurologist during her convalescence and was suspected of having had an initial cerebellar attack of disseminated sclerosis. It appears likely that this condition has been endemic in this country for many years, having been confused with disseminated sclerosis or with Ménière's syndrome.—I am, etc.,

Stroud, Glos. S. C. ROGERS.

Eosinophils and Blood Clotting

SIR,—Dr. Z. Z. Godlowski's preliminary report (April 21, p. 854) prompts us to report some of our observations, which were made on 59 rats and three men. We observed in eight out of nine rats that high dosages of intravenous heparin (6 mg. per 100 g. body weight and above) regularly produced significant eosinophilia, while doses of 2–3 mg. per 100 g. or below did not produce it in three cases. The eosinophilia begins to appear as soon as 15 minutes after the intravenous administration, and is of about 24 hours' duration, or longer. Traumatic or operative shock (5 rats) abolished or prevented the phenomenon. Therefore the following experiments were carried out three to four days after the operations were performed. In these trials the heparin eosinophilia was unaffected by bilateral adrenalectomy (4 rats). Divergent results were gained after splenectomy (4 rats). Subtotal hepatectomy (4 rats) seemed to interfere in some degree with the four-hour eosinophil response.

Studer (1950) found that a heparin resistance occurred during the acute phase of liver damage produced by carbon tetrachloride and trypan-blue.

We succeeded in preventing eosinophilia with toluidine-blue in one animal. Adrenaline abolished eosinophilia within 25 minutes in two animals, but not after adrenalectomy in one other.

Further, we attempted to produce eosinophilia in three humans. The usual doses of 150–250 mg. (heparin vitrum and "liquemin") failed to give a positive response in the first four hours. We therefore concluded that heparin could hardly play a part in the physiological regulation of circulating eosinophils. Dr. Godlowski gave pharmacological doses of about 1,000 mg. heparin in his human experiments, and our rat doses also are of pharmacological magnitude. It must, however, be mentioned that the heparin preparations used were of animal origin and seem to be not identical with the human one.

During the experiments we expected to find a rather close connexion between circulating eosinophils and blood clotting. Shortening of the clotting time represents an archaic defence mechanism of organisms, and like eosinopenia it seems to accompany different life stresses (Cannon and Gray, 1914). Bertelli, Falta, and Schweeger suggested already in 1910 a possible connexion between vegetative tone and blood eosinophils. The eosinophil count of humans slightly increased during sleep, and also in our three barbiturate-treated rats, and the clotting time was slightly prolonged.

It seemed to us that, according to the dynamic state of regulation, quicker coagulation is accompanied by eosinopenia and increased clotting time by eosinophilia. Takats's experiences (1950) on operated patients seemed to confirm

our suggestion. Thus, besides the hypophyseo-adrenal regulation of homoeostasis the systems regulating blood coagulation also play a part in response to different stresses. Later still we gained some results hardly explainable only by the factors regulating coagulation.

The following conditions gave rise to eosinophilia in rats: both adrenaline (two cases) and acetylcholine (four out of five) in adrenalectomized animals; high salicylate doses (four cases) in adrenalectomized animals. Dury (1950) observed a significant increase in the number of circulating eosinophils after splenectomy and adrenalectomy-splenectomy, and Janovics and Tiszai in this clinic after subtotal hepatectomy in rats.

The anticoagulant "liquoid" (Roche), a polyanethol derivative, only irregularly evoked eosinophilia even after 12 hours, and with doses of 4–7 mg. per 100 g. rat (six cases). An eosinopenia was observed in five out of six cases at the fourth hour. A connexion, however, existed with the bleeding time, and the eosinopenia of the fourth hour was accompanied by the acceleration of clotting.

Stressing doses of intravenous salicylate caused only slight or insignificant eosinophil-rebound (three cases) in the hypoprothrombinaemic phase of Link, Overman, Sullivan, Heubner, and Scheel (1943), and also repeated effective oral doses of dicoumarol only elicited eosinophilia irregularly (three cases). In a few cases of different experiments there was an easily demonstrable divergence of clotting and the eosinophil count. Prothrombin time, clotting time, etc., were not measured in our experiments and only estimation of bleeding was our indicator. It proved to be sufficient.

According to Bickel (1950) the failure of blood to coagulate in cases of anaphylactic shock is mostly accompanied by eosinopenia, and eosinophilia only develops subsequently, while coagulation time tends to remain normal. Further, although results with cortisone and A.C.T.H. are divergent in this relation, it can be said that prolongation of the clotting time accompanied the eosinopenia of single doses of cortisone and A.C.T.H. (Smith, Margulis, Brennan, and Monto, 1950).

Finally, we add that Jancsó at this University noted in 1931 that anticoagulants exert a marked inhibition of the storage capacity of the reticulo-endothelial system.

Thus, after recognizing some facts about the effect of pharmacological doses of heparin, the mystery of eosinophils remains yet unsolved.—We are, etc.,

Szeged, Hungary.

E. KELEMAN.
M. MAJOROS.
T. JANOVICS.

REFERENCES

Bertelli, G., Falta, W., and Schweeger, O. (1910). *Z. klin. Med.*, **71**, 23.
Bickel, G. (1950). *Sem. Hôp., Paris*, **26**, 3793.
Cannon, W. B., and Gray, H. (1914). *Amer. J. Physiol.*, **34**, 232.
Dury, A. (1950). *Amer. J. Physiol.*, **163**, 96.
Janovics, T., and Tiszai, A. Unpublished.
Link, K. P., Overman, R. S., Sullivan, W. R., Heubner, C. F., and Scheel, L. D. (1943). *J. biol. Chem.*, **147**, 463.
Smith, R. W., Margulis, R. R., Brennan, M. J., and Monto, R. W. (1950). *Science*, **112**, 295.
Studer, A. (1950). *Acta Haemat., Basel*, **3**, 278.
Takats, G. de (1950). *J. Lab. clin. Med.*, **36**, 817.
von Jancsó, N. (1931). *Klin. Wschr.*, **10**, 537.

Conception and Oligozoospermia

SIR,—Miss M. Moore White and Dr. Mary Barton (May 19, p. 1142) have drawn my attention to a number of references dating from 1919 to 1948 concerning unspecific factors which impair testicular function and have emphasized the influence of nutritional deficiency. The Biological and Medical Committee,, reporting to the Royal Commission on Population (*Papers of the Royal Commission on Population*, vol. 4, 1950, H.M. Stationery Office, p. 43), considered carefully all the available evidence on this aspect of infertility, and said this concerning the possibility that an inadequate or unbalanced diet might reduce human fecundity:

"We do not think that this conjecture has much bearing on our problem, for the following reasons: (i) As the diet of the population of Great Britain as a whole is now much superior to what it was 100 years ago; yet the birth rate has diminished in the period. (ii) The diet of the Registrar-General's Classes I and II was, in 1911, more abundant, better balanced, and of better quality than that of classes IV and V. Yet the birth rate of the last two classes was then higher than that of the first two. (iii) In the large cities of India, the depressed or scheduled classes live according to dietetic standards far lower than any known in this country. Yet they have immense birth rates."

It seems unlikely, therefore, that mere correction of possible dietary errors can be claimed as a cause of a husband, who shows extremely defective spermatogenesis, achieving parenthood. Nor do I believe that "administration of iron and arsenic" (apparently in the absence of haematological evidence of anaemia) "following general medical principles" could be regarded as the reason why any of the three husbands reported on became fathers.

Miss Moore White and Dr. Barton point out that it is a remarkable fact that in spite of a very low sperm count men sometimes prove to be fecund. This completely agrees with our observation at the Chelsea Fertility Clinic and with the opinion of the Biological and Medical Committee of the Royal Commission on Population, who expressed the view (p. 40) that "men whose semen appeared on examination grossly defective have been known to effect conception."

My reason for criticizing (April 21, p. 882) the original contention of Miss Moore White and Dr. Barton (April 7, p. 741) was that they claimed that a series of non-specific forms of treatment was the cause of the three husbands reported in their memorandum achieving parenthood. It is my personal opinion that one has no right to make such a claim, and that it is therefore one's duty to tell such a husband that though he may possibly eventually succeed in becoming a father there is at present no proved therapeutic measure which offers him a reasonable chance of doing so.—I am, etc.,

London, W.1. P. M. F. BISHOP.

Early Diagnosis of Infective Hepatitis

SIR,—Many of these cases are clinical puzzles until the appearance of a dark urine gives a welcome clue; and since not a few are associated with abdominal pain and fever there may be much anxiety. In your refresher course (May 26, p. 1198), as in all textbooks, nausea and loss of appetite are noted as early symptoms. But in my experience frequently *the patient will refuse both solids and fluids of every description* even when there is no vomiting, and this may apply both to febrile and afebrile cases. Since I first observed this peculiarity a couple of years ago I have failed to notice its occurrence in any other condition; but it has appeared regularly in the few cases of hepatitis which have come my way, and it has thus been possible to make a tentative diagnosis several days before the actual jaundice appeared. If the patient can be induced to take some fluids the advantage of early expectant treatment on a fat-free diet (instead of the usual milky slops) where a hepatitis is developing needs no stressing.

Naturally, a country practitioner like myself cannot quote a large number of cases, and I write to you because it would be most useful and interesting if others have made a similar observation, or can confirm it out of their recent experience.—I am, etc.,

Shipton-under-Wychwood, Oxon. GORDON SCOTT.

Morphine and Pancreatic Secretion

SIR,—Dr. H. T. Howat (May 26, p. 1207) raises the pertinent point that morphine, by virtue of its action on the sphincter of Oddi, ought to be regarded as one of the factors responsible for the abnormal serum enzyme findings which have been reported in cases of perforated peptic ulcer. It so happens that I did take the precaution of carrying out the initial enzyme estimations before the cases which were reported in my paper (May 5, p. 995) had received opiates or other sedatives.

I should like to take this opportunity of mentioning that I hope soon to publish observations on the pancreatic side-effects of morphine. Previous observers have used secretin to stimulate the pancreas prior to the administration of morphine (Lagerlöf, 1945, 1947; Myrhe, Nesbitt, and Hurly, 1949), and the more potent combination of mecholyl and secretin has also been given a trial (Burke, Plummer, and

Bradford, 1950). My work is mainly concerned with the effects of morphine on normal subjects after supplying the natural stimulus of a well-balanced meal. The effects of carbachol on the pancreatic secretion, which so far have received little or no attention, will also be taken into account.

Dr. Howat refers to other conditions, such as gallstones and intestinal obstruction, which may affect the tonicity of the sphincter of Oddi. I have yet to be convinced that the mere presence of stones in the gall-bladder is likely to cause an arrest of the delivery of the pancreatic juice to the duodenum as the result of reflex spasm of this sphincter. It is, however, well known that stones in the common bile duct may evoke a rise in the serum enzyme levels which is not necessarily associated with any appreciable morbid change in the pancreas, and in these cases the causal mechanism is surely a simple mechanical block of the duct of Wirsung. The following data taken from my files may be of interest. Serum amylase (Somogyi) and lipase estimations (Crandall and Cherry) were carried out on 19 biliary cases, five of which had stones in the common bile duct. Elevated readings were found in only one patient who was examined 24 hours after the onset of the acute abdominal symptoms. At operation a week later the pancreas presented a normal appearance, but five faceted stones were picked out of the lower part of the common duct and a chronically inflamed gall-bladder was removed.

The details of the enzyme findings in this case are given below:

	Amylase Units /ml. serum	Lipase ml. N/20 NaOH per ml. serum
February 24, 1943	1,830	2.1
February 26, 1943	460	4.4
February 28, 1943	210	1.8

The only reference to abnormal values in intestinal obstruction which I have come across was in a paper by Johnson and Bockus (1940). They suggested that the pancreas in the four cases cited might have become affected either by the distension of, or by the absorption of toxins from, the part proximal to the obstruction: absorption of the digestive ferment (which happened to be lipase) from the obstructed loops was also offered as an explanation. My observations, which extended to six cases all of which had faecal vomiting, failed to yield positive results for either amylase or lipase.—I am, etc.,

Glasgow. HENRY WAPSHAW.

REFERENCES

Burke, J. O., Plummer, K., and Bradford, S. (1950). *Gastroenterology*, **15**, 699.
Johnson, T. A., and Bockus, H. L. (1940). *Arch. intern. Med.*, **66**, 62.
Lagerlöf, H. O. (1945). *Acta med. scand.*, **120**, 407.
—— (1947). *Acta physiol. scand.*, **13**, 306.
Myrhe, J., Nesbitt, S., and Hurly, J. T. (1949). *Gastroenterology*, **13**, 127.

Treatment of Perforated Ulcer

SIR,—There has been considerable controversy recently in the journals about the best method of managing perforated peptic ulcers. Assessment of the value of a treatment has tended to be based on the mortality in an unselected series compared with a similar series treated another way. This of course is fallacious, as certain cases may be best managed one way, others another; at best the use of such statistics shows that, *if all cases are to be treated alike*, one method may be better than another. I do not hold the view that all cases should be treated alike; the essence of wise surgery is intelligent selection, not the use of a rule-of-thumb. I would like to emphasize this point in view of the reverence which seems nowadays to be given to unselected series—as though surgery could be reduced to a mathematical science.

I and some of my colleagues have for the past few years adopted three methods of treating perforations, and careful selection of cases is always exercised.

Conservative.—This we adopt in perforations which when first seen show evidence of localization of the peritonitis; there is little lower abdominal rigidity, and the pain is less severe than it was. Many of these cases are difficult to distinguish clinically from acute exacerbations of a peptic ulcer, but a straight *x*-ray reveals the tell-tale crescent of gas above the liver. In any case the distinction is not important, as the treatment for both conditions is non-operative.

Radical.—By this I mean immediate gastrectomy. For this treatment the patient must, in my opinion, fulfil the following conditions: (*a*) there must be a definite indication, other than the single occurrence of a perforation, for gastrectomy—e.g., previous perforations, long-standing chronic ulcer, previous major bleeds; (*b*) the patient's condition must be excellent, and we have restricted its use largely to the younger age groups; (*c*) the perforation must have occurred recently—usually so that operation is possible within four hours; (*d*) at operation it must be evident from the conditions found that the gastrectomy will prove relatively easy. My colleagues and I have done 15 such gastrectomies without any mortality and with excellent results.

Suture.—Operative suture remains the treatment for the majority of cases.

The wisdom of immediate gastrectomy even in selected cases is of course disputed, and I feel that one factor which now influences me against it in some cases is my view that the Billroth I gastrectomy—or the Shoemaker modification of it—gives much the best functional results; and that a perforated ulcer which is not technically amenable to such a procedure might become so if sutured and allowed to settle down.

In conclusion I would emphasize again that, in a problem with as many variable factors as perforated peptic ulcers, statistics over a few hundred unselected cases can never be as adequate a guide to the surgeon as wisdom, compounded as it is of knowledge and experience.—I am, etc.,

Leicester. P. HICKINBOTHAM.

The Acute Mental Case

SIR,—Dr. Desmond Curran's otherwise lucid and comprehensive account of dealing with the above condition (May 19, p. 1134) surely errs on the side of over-caution. It is, in my opinion, only humane to give the anxious and distressed relatives in these cases the consolation of the infinitely brighter prognosis which was ushered in by the development of E.C.T. and insulin-coma therapy. After all, the acute mental case is usually only the *neglected* mental case, and had action been taken a week or two earlier would probably have been a mild mental case, willing to enter a hospital as a voluntary patient. The appearance of acute symptoms, therefore, in no way lessens the chances of complete recovery (apart from the dangers of an accident or dehydration), provided treatment is prompt and adequate.

The necessity to use force in these cases, fortunately now very rare, would in my opinion be much rarer still if doctors and relatives could appreciate that the acute mental case has become as a rule, in addition to his neurotic or psychotic symptoms, merely terror-stricken, and that therefore a calm, confident, sympathetic approach will often allay much of his restlessness and threatened violence and obviate any struggling worth mentioning.

I would strongly endorse Dr. Curran's warning of the danger of depressive symptoms. In these days when the latter can be removed almost overnight it is almost inexplicable to find these patients being treated for weeks or months on end by sedatives, tonics, etc.—I am, etc.,

Armagh, N. Ireland. ROBERT THOMPSON.

Clinical Significance of Vitamin A

SIR,—Your abstract of Dr. Z. A. Leitner's address (May 19, p. 1110) and especially the section on febrile conditions (p. 1113), may at last stimulate interest on the role of vitamins A and D in infections generally. I have been interested in this subject for 21 years, and have added reason for interest in that I owe my life in an attack of septicaemia in 1933 (contracted from a patient who died of it three days later) to treatment, by injection, with large doses of these vitamins.

Interest in the possible beneficial effects of large doses of vitamin A was discounted by the fact, which Dr. Leitner mentions, that large supplies of vitamin A are found in the livers of patients dying of long febrile illnesses, and this

was known some while before Lindqvist's paper in 1938. Indeed it was this, among other things, which led me (*Lancet*, 1938, **1**, 599) to postulate that in febrile conditions there is some interference with the mechanism of the liberation of vitamins A and D into the blood, and this accounts for the poor response to oral administration of these vitamins. I also think that there is some synergic action of the two fat-soluble vitamins, for I can obtain with regularity results from injection of the two together which I cannot from either singly.

Dr. Leitner now confirms that there is a marked drop in the serum content of vitamin A in febrile conditions, and the only way, therefore, whereby this content can be raised to normal must be by injection, in order to by-pass the liver. I have used intragluteal injections of an oily solution, which are not ideal, for other muscles seem to tolerate them badly, but emulsions fine enough for intravenous injection were—and perhaps still are—difficult to make and keep stable, and the newer water-miscible solvents were not then in use.

Clinical experience obtained over these 21 years shows clearly that vitamin A (and D) has a very definite effect on a febrile temperature; in fact the injection of 1 ml. of "dekadexolin" will markedly lower the temperature for some 24–36 hours. Doubling the dose will prolong but not increase this effect, and it will certainly be rather uncomfortable for the patient. If, however, the second millilitre is given at the same time into a different area or into the other buttock, the depression of the temperature will be increased but not doubled, because, presumably, though the area of absorption has been doubled the serum is not able to take up more than a certain amount. This action of dekadexolin on the temperature is visible in a few hours after the first injection and its euphoric effect on the patient is quite definite. If at the same time a little aspirin and Dover's powder are given the patient will often have a soaking perspiration, after which he feels very much better and the febrile process may have come to an end. The action is quite different from either sulphonamides or penicillin, and I still get patients who will respond to neither of these and yet clear up after one or two injections of dekadexolin. Dekadexolin has the great advantage that it makes the patient feel better (often much better than he really is) instead of depressed or exhausted—i.e., its action seems to be on the patient rather than on the infecting organism.

Naturally, as a general practitioner, I can only observe clinical effects and speculate about the mechanisms by which they are produced, but I am fairly confident that these mechanisms are really vital to our knowledge and control of disease. It seems to me sad that legitimate enthusiasm for sulphonamides and the antibiotics should have rather eclipsed interest in the patient and his reactions. I have written about this matter many times in the last 17 years but no one seems to take much notice, I suppose because G.P.s are seldom genuinely expected to see or find out anything; but that does not alter the observation that here is a way by which lives can be saved, illness curtailed, and knowledge extended, if only doctors will use it.—I am, etc.,

Winsford, Cheshire. W. N. LEAK.

Bitten by Adder

SIR,—The haemorrhagic and thrombotic effects of viper venom are well known and it is generally agreed that in the healthy adult these effects are not likely to endanger life after a bite from a British adder. Hamilton Fairley (1936) states that viper venom contains a third agent which produces peripheral vascular failure; and Walker (1945), discussing poisoning by the British adder in 30 cases in which he had been able to collect case-notes, comments that, in addition to the local haemorrhagic signs, there is a general reaction varying from slight weakness to profound collapse. In the following case the general reaction was alarming, while the vascular effects gave rise to little anxiety.

The patient, male, aged 18 years, weight 10 st. 8 lb. (67 kg.), and of good physique, was undergoing a routine course at Brompton Hospital Sanatorium for bilateral apical disease of moderate extent. On June 12 at 10.20 a.m. he presented himself carrying a dead adder about 22 in. (56 cm.) long. Five minutes previously, while doing his walking exercise, he had seen the snake and picked it up between the left thumb and index finger. The snake bent itself sideways and bit him on the left index finger. Examination of the finger showed one puncture wound on the terminal phalanx, with some swelling up to the proximal interphalangeal joint. The patient looked and felt well. Since only one fang had struck home and the patient had immediately sucked the wound till it bled, no local treatment was given. He was told to rest on his bed.

At 11 a.m. he felt ill, and was pale and sweating. Blood pressure 68/? mm. Hg. Persistent vomiting and diarrhoea. Intramuscular injection of adrenaline (1/1,000) 7½ m. (0.45 ml.) given.

At mid-day there was great deterioration of the general condition: anxious; sweating; cold clammy skin. Blood pressure 58/?. Pulse rate 146 on auscultation of the heart; pulse impalpable at the wrist. Hexobarbitone 0.39 g. and "anthisan" 100 mg. not retained owing to continued vomiting. 1.7 ml. nikethamide and 0.09 g. ephedrine injected intramuscularly with no improvement. In view of the clinical picture of severe shock it was decided to give a plasma transfusion.

At 1 p.m. plasma transfusion started.

At 3.30 p.m. transfusion of two pints (1,120 ml.) of plasma completed. Skin warmer. Pulse rate at wrist 120. Blood pressure 116/68. "Antivenin" had now been obtained, but was not given, since the patient's general condition had greatly improved.

On the following day he felt well, with pulse 88, blood pressure 116/68. Haemoglobin 112%. Red blood cells 6,200,000 per c.mm. White blood cells 18,800 (polymorphs 77%). Subsequent progress uneventful.

Within 48 hours of the bite the whole of the left arm and hand became swollen with pitting oedema, and there was bruising on the inner aspect of the upper arm. The swelling subsided in four days and there was yellow discoloration of the arm and forearm for a week.

The improvement in the patient's condition was almost as sudden as the initial collapse, and it occurred during the transfusion of plasma, the first pint of which was given in about half an hour. This may have been coincidence, but we feel that there is a case for giving plasma immediately after an adder bite, pending the arrival of antivenin, which is not usually available at once. Mathias and Ffrench (1947) publish two cases in which "benadryl" appeared to be effective in combating the shock following adder bite; it was given by mouth in one case, and by both mouth and rectum in the other. In our case oral administration of "anthisan" was useless owing to vomiting, and the severe diarrhoea would have prevented rectal administration. An antihistamine drug given parenterally might have been beneficial in view of the experience of Mathias and Ffrench.—I am, etc.,

Aldershot, Hants. DERYCK L. H. GODDARD.

REFERENCES

Fairley, N. H. (1936). *British Encyclopaedia of Medical Practice*, **2**, 343.
Mathias, H. H., and Ffrench, G. E. (1947). *British Medical Journal*, **2**, 146.
Walker, C. W. (1945). Ibid., **2**, 13.

POINTS FROM LETTERS

Obstinate Tapeworm

Colonel S. G. S. HAUGHTON (Cranleigh, Surrey) writes: The advice given (May 19, p. 1154) will fail in the majority of cases. It is merely textbook teaching and not clinical bedside experience. The one essential in treatment is the starvation of the patient—this ensures the starvation of the worm. Then fresh liquid extract of filix mas will do its work.

Use of Ascorbic Acid with A.C.T.H.

Dr. J. BURNHAM KING (Cape Province) writes: I have been surprised at the little attention paid to the role of ascorbic acid in treatment with A.C.T.H. While it is only conjectural, this assertion nevertheless has strong experimental backing: it is known that there is a nearly linear relationship between A.C.T.H. dose and degree of adrenal ascorbic acid depletion. This suggests most strongly that there is some relationship between adrenal hormones and ascorbic acid (perhaps in the so-called "amorphous fraction"). At the very lowest estimate, it would be sound, physiologically, to keep the adrenals supplied with extra ascorbic acid during courses of A.C.T.H.

Obituary

SIR THOMAS WATTS, M.D.

Sir Thomas Watts, who was in practice at Hyde, Cheshire, for nearly thirty years, died at Southport on June 3, aged 82.

Born at Hyde, Cheshire, the eldest son of Dr. John Taylor Watts, J.P., he lived in the atmosphere of family practice from his earliest days, and even in retirement maintained an active interest in the well-being of general practitioners. From Bolton Grammar School he went on to Owens College, which has this year celebrated its centenary and is now the University of Manchester. His clinical instruction was undertaken at the old Manchester Royal Infirmary in Piccadilly under the many famous savants associated with that institution. In 1889 he graduated M.B., B.S. Durham, proceeding M.D. three years later. Immediately after qualification he entered the practice of the late Dr. George Sidebottom, of Hyde—a practice with which his father was closely associated—and in this fine old industrial family practice he obtained invaluable experience. He was an obstetrician of no mean order, and his skill as a surgeon—at a time when surgery was performed in the patient's own home, and the doctor's surgery was a true surgery—extended beyond the immediate neighbourhood in which he resided. A most versatile man, Watts took the degree of B.Sc. of the Victoria University of Manchester while busily engaged in practice. He was proud to be known as a family doctor, and "Dr. Tom," as he was familiarly known, gave to his patients, in partnership with his brother Dr. James Watts, and aided by many well-trained assistants, all the medical, surgical, and obstetrical services which their patients required. He held numerous public appointments. As the surgeon to several local factories engaged in various industries he attained a unique and practical knowledge of industrial medicine. He was for some years honorary treasurer of the Incorporated Association of Factory Surgeons and at one time held the office of president. In 1902 he contributed an article to this *Journal* on the subject of "Shuttle Threading as a Source of Infection," a process which was giving rise to much anxiety among cotton operatives.

Watts strongly opposed the introduction of a national medical service, inasmuch as he believed it violated the private and confidential nature by which family practice was sustained. Nevertheless, he accepted the inevitable and gave valuable service as a member of the Insurance Committee of the County Palatine of Chester. He was an ex-president and ex-chairman of the Ashton-under-Lyne Division of the B.M.A. and was also a former vice-president of the Lancashire and Cheshire Branch. In later years he served on the Parliamentary Elections Committee of the Association. He retired from practice in Hyde in 1921, and shortly afterwards went on a tour of South Africa. It was there that in 1922 he married Dorothy Dudley, daughter of Mr. Alfred Ryder, of Durban, Natal. Returning to England, he continued to work as a consultant physician in Manchester and took an active interest in politics. In 1922 he became Conservative M.P. for the Withington Division of Manchester, defeating his Liberal opponent, Mr. E. D. Simon (now Lord Simon of Wythenshawe) by 670 votes. The following year he lost the seat to Mr. Simon, but in the election of 1924 Watts regained it with a majority of over 3,000, and he held it until 1929. His maiden speech, on vaccination, was a great success. About this time he was greatly impressed by the Spahlinger method of treating pulmonary tuberculosis. He made personal contact with Spahlinger in Geneva, and there studied his technique and investigated his results. He was a member of a party of medical members of Parliament who reported on this form of treatment, recommending its official recognition by the Ministry of Health.

For his public services Watts received the honour of knighthood in 1928. His death severs another link with a race of medical practitioners who did so much to enhance the position of domestic medicine in this country. He is survived by his widow, his son, who is in the Royal Navy, and his daughter.—J. K.

M. P. REDDINGTON, M.B., F.R.C.S., M.R.C.O.G.

Mr. M. P. Reddington, senior obstetric surgeon t the Woolwich Memorial Hospital, died in the Middlesex Hospital on May 25 at the early age of 51.

Mortimer Philip Reddington was born at Christchurch, New Zealand. He had his schooling there and graduated in medicine from Otago University, where he gained a much-prized trials cap for the "All Blacks." After a brief spell of practice in Wellington, he came, at the age of 25, to this country to take the English F.R.C.S., which he did in 1933. About two years after his arrival here he married and went to a country practice in Colchester, where he was both happy and successful. When he obtained the Fellowship he came to London to specialize in obstetrics and gynaecology. His earlier appointments—resident at the Jessop, registrar at the Grosvenor, and registrar at the Royal Waterloo—indicated that he was already leaning towards this specialty. His personal magnetism, his real sympathy with patients, and his surgical skill ensured that he was immediately successful, and soon he was a well-known figure in London medical circles. He took the M.R.C.O.G. in 1936. His hospital practice at this stage was confined to the Memorial Hospital at Woolwich. Then in 1939 began a series of events which changed him from a man controlling his destiny to one who must perforce watch it unfolding itself. He was fortunate that he possessed the courage to do so. He had joined the R.N.V.R. in 1932, so at the outbreak of war he was called to the Navy with the rank of surgeon lieutenant-commander. In this he served until he was invalided out. While he was in the Service his young wife died. Coming out of the Navy, he went first to a country practice in Bridgwater to recuperate, but soon was back in London to gather up the threads. Here he was injured in an air raid, but when he had recovered he took on additional hospital appointments at the Royal Hospital, Richmond, Queen Mary's Hospital, Sidcup, Joyce Green Hospital, and the Bexley Maternity Hospital—and in fact was working harder now than ever before. The strain told on him, and in his last 18 months it was clear that he was becoming seriously ill. Nevertheless, he kept on till he was no longer able to continue.

Reddington was a man of culture, and he wrote verse as well as prose. His style was effortless, as his series of articles, "Problems in Obstetrics," showed. In the years before the war he was able to indulge his love of sport and games—golf at Tonbridge and St. George's Hill, tennis at Hampton Court or Lord's, and an occasional

day's shooting. Quite recently he married Mrs. Beryl Cookson; to her and to his three sons, two of whom are medical students, the sympathy of his friends and colleagues goes out.—C. K. V.

HAROLD UPCOTT, F.R.C.S.

Mr. Harold Upcott, late senior surgeon to the Hull Royal Infirmary, died at his home at Thornton-le-Dale, Yorkshire, on May 24, aged 71.

Educated privately, Upcott received his medical training at St. Thomas's Hospital, and took the conjoint diploma in 1902. After holding resident appointments at St. Thomas's he became a Fellow of the Royal College of Surgeons in 1904. After a clinical assistantship at the Samaritan Hospital for Women he went to Leeds as private assistant to the late Lord Moynihan, and in 1907 was appointed honorary assistant surgeon to the Hull Royal Infirmary. Apart from the first world war, when he served as a surgical specialist with the 37th C.C.S. in France and Italy, and was twice mentioned in dispatches, he spent the remainder of his professional life in Hull, becoming in 1919 a full surgeon at the infirmary, to which he rendered outstanding services. His large consulting practice extended into East Yorkshire and North Lincolnshire. During the second world war, though due to retire, he took on the duties of adviser in surgery to the E.M.S., and was largely responsible for the efficient running of this side of the service in East Yorkshire. He was a Fellow of the Association of Surgeons, one of the original members of the Moynihan Surgical Club, and past president of the Hull and East Yorkshire Branch of the B.M.A. and Hull Medical Society. Upcott was a surgeon of outstanding ability and versatility, and his careful and gentle technique was an object-lesson to all; his former house-surgeons, many of whom have since become surgeons both at home and abroad, will look back with gratitude on the stimulating experience of working with him in their formative years. He possessed great personal charm, and was a man of quiet and unassuming disposition, inspiring loyalty and affection in all who worked with him. A keen student of nature and a great lover of all country pursuits, he had many interests outside medicine. The sympathy of his many friends and colleagues goes out to his widow and three sons.—J. N. Y.

Mr. R. B. Blair writes: Harold Upcott's death has torn a gap in the ranks of English surgery. His reputation as a surgeon was not limited to Hull, Yorkshire, but was wide and generally established. His technique, probably based on his association as an assistant with Moynihan, was pre-eminent and could readily compete with the best in the world. From my knowledge of and association with him for over thirty years I can willingly and readily vouch for his great skill, and complete faith in his ability was easy of attainment. Apart from his surgical skill, Upcott was a man of many parts. I know that he encouraged the younger men who showed enthusiasm and some ability. He possessed a personal charm which endeared him to patients and friends alike. His passing will ever be a sad event in the lives of many, who will never forget his life and work. Such men as Upcott are rare and far between.

Dr. W. F. McLEAN, who practised in Haddington for over 30 years, died on May 28 in the Royal Infirmary, Edinburgh, after a short illness. A "son of the manse," William Farquhar McLean was born in 1888 at Boddam, Aberdeenshire, spent most of his boyhood days at Cullen, Banffshire, and laid the foundation of his education at Fordyce Academy. He went on to Edinburgh University, where after a distinguished undergraduate career he graduated M.B., Ch.B. in 1912, proceeding M.D. in 1920. After various appointments in the Royal Infirmary, Edinburgh, his career was deflected by the outbreak of war in 1914, when as a lieutenant in the R.A.M.C.(S.R.) he went to France with the original B.E.F. He served throughout the war with distinction as M.O. of one of the Guards battalions, as D.A.D.M.S. of a division, as O.C. troops in a hospital ship during the Gallipoli campaign, and finally as commanding officer of a field ambulance with the rank of lieutenant-colonel. For his services he was mentioned three times in dispatches and was awarded the Military Cross. On demobilization in 1919 McLean entered general practice in Haddington in partnership with the late Dr. H. H. Robarts, and for the next 32 years conducted a busy and extensive practice which alone would have taxed the strength of most men. McLean, however, had many other interests and activities in the professional, medico-political, social, and recreational fields. In 1945 he succeeded Dr. Robarts as medical superintendent of East Lothian Mental Hospital, and was for many years M.O. of Alderston Convalescent Home, Haddington. Among his other appointments were: medical referee under the Workmen's Compensation Acts; medical referee to the Ministry of Labour and National Service; M.O. to the Post Office; M.O. to the Christie Children's Homes, and to Tynepark Home. A keen and active member of the B.M.A., he was for many years a member of East Lothian insurance committee and chairman of the local panel committee, and, since 1948, a member of the Lothians and Peebles executive council, and vice-chairman of the local medical committee. He held office as chairman of the Lothians Division from 1939 to 1940, and he was also president of East Lothian Medical Practitioners Society, being the moving spirit at its clinical meetings and social functions. A good golfer, he was also a first-class rifle shot, the winner of numerous trophies at Bisley. To the training of V.A.D.s, the organization of first-aid work in relation to Civil Defence, and to the British Legion he unselfishly devoted much valuable time.

O. D. J. writes: It was with a tragic sense of personal loss that his colleagues and the general community in East Lothian learned of the death of Dr. W. F. McLean. The bare recital of so numerous interests and activities is surely evidence enough of his sterling worth. He looked so strong and sturdy (almost Churchillian in appearance and constitution) that those who lived close to him thought him indestructible. In spite of all the other calls on his time, his first concern was always for his patients. He had the ideal temperament for the exacting job of G.P.—kind, generous, hospitable, human, approachable, not easily ruffled, and willing at any time of the day or night to go to the help of a patient or a colleague. He was in fact the best type of G.P., with more than average skill, knowledge, and experience in most branches of medicine and surgery, and ever searching for the truth—even to the extent of liking to perform post-mortem examinations.

Dr. ALEXANDER CRUICKSHANK, who had been in general practice in Buckie for the past 25 years, died suddenly in the Royal Infirmary, Aberdeen, on June 2 at the age of 47. Alexander Cruickshank was educated at Strichen Secondary School and Aberdeen University, where he graduated M.B., Ch.B. in 1925. After a year's residency in the Sick Children's Hospital, Aberdeen, he went as assistant to Dr. George Hendry in Buckie, Banffshire, and became a partner in 1935. Eleven years later he established his own practice in the town. He had a high reputation as a medical practitioner in the district, particularly for his work in obstetrics and paediatrics, and his unfailing good humour and friendliness endeared him to his patients, for whom he was a real family doctor, giving his whole time and energies for the benefit of those in need without thought of material reward. He took a keen interest in the sporting activities of the town, and was a member of the B.M.A. for 15 years. There could

be no better tribute to his memory than the appreciation published in the local newspaper: "Perhaps no more popular man than the late Dr. Cruickshank ever served the public of Buckie." He leaves a widow and two children, aged 11 and 7 years.

Dr. W. ASTEN, for many years chairman of the health committee of the Bournemouth County Borough Council, died in Bournemouth on June 4, aged 84. Walter Asten was born in Dewsbury and educated at Batley Grammar School and Mason University College, Birmingham. Qualifying in 1900, he was in general practice for several years near Wakefield, where he held a number of public appointments. He was called to the Bar in 1911, and for three years he practised as a barrister in London. However, in 1914 he returned to medical practice, settling in Bournemouth. It was about this time that he graduated M.D. at the University of Brussels. Always a keen temperance advocate, he became for a few years medical superintendent of Rendlesham Hall in Suffolk, but he returned to Bournemouth, where in 1927 he began his long association with the health committee of the town council. One of his achievements was the establishment before the war of a municipal cancer clinic, where free advice was given to any person who attended. Asten, who took a keen interest in the work of the B.M.A., was much respected by his colleagues. For many years he was secretary of the Dorset and West Hants Branch, and its president in 1933–4. Besides being a representative of the Bournemouth Division at many annual meetings, he held office as chairman of the Division in 1928–9. He was also a member of the Public Health Committee of the Association from 1931–6. A man of the highest principles, Asten's work for the community and for his profession will long be remembered.

By the death of Dr. EUGENIUS HARVEY Bermuda has lost one of its most popular and gifted medical practitioners. He died suddenly on May 23 at the early age of 47. He studied medicine in this country at Oxford (Merton College) and the Middlesex Hospital, qualifying in 1929 and graduating B.M., B.Ch. in the following year. While in practice in Bermuda he attracted the genuine affection of those with whom he worked, of the patients he served, and of numerous friends. He was a skilled surgeon, and was particularly interested in the artificial pneumothorax treatment of tuberculosis. He was the first doctor in Bermuda to perform a replacement transfusion in erythroblastosis foetalis. But it is not only for his high professional competence that he will be remembered. He was sympathetic in a true sense, for he felt and suffered deeply with others. He is survived by his widow and two children.

Mr. I. F. MCASH, senior dental officer to the Lancashire County Council, died suddenly on May 28 in Southport at the age of 51. Ian Fleming McAsh was a native of Edinburgh, and was educated at George Watson's College and Edinburgh University, where he studied both dentistry and medicine, qualifying in the former in 1921 and in the latter a year later, when he became temporary assistant medical officer to the Royal Albert Institute for the Feeble-minded in Lancaster. He then went into private dental practice in Edinburgh, where he obtained the H.D.D. R.C.S. in 1932. Some years before this he had entered the school dental service of the Lancashire County Council. Children's health was his great concern, and he was the author of articles dealing with anaesthesia and oral and dental sepsis in schoolchildren. He also wrote a *Dictionary of Dental Diseases and Treatment*. These writings would suggest that he was more dentist than doctor, but this was not so. Every advance in medicine was known to him, and this knowledge was full and intimate, rendering him capable of critical suggestion and comment. During the second world war he was one of the medical officers to the Southport battalion of the Home Guard. This, with his county duties and other activities, made the war years very strenuous for him, and its end left him with impaired health. Thereafter all his energy had to be reserved for his work, and so he became deprived of the normal recreative and social outlets. This he did not resent, for the deprivation was fully compensated by his contentment in his home life. He continued at work till within two weeks of his death, and this is how he would have wished it to be. The quick, penetrating, but gentle glance of the eyes so often accompanied by a quiet chuckle and flashing smile are lost to us, but the memory remains. To his widow and son his colleagues on the medical and dental staff of the Lancashire County Council and his many friends, both lay and professional, extend their deep and sincere sympathy.—P. Y. L.

Medical Notes in Parliament

AGED SICK

Mr. ANTHONY GREENWOOD, in the Adjournment Debate on June 6, drew the attention of the House to the problem of getting old people into the chronic sick wards of hospitals. He said that the Parliamentary Secretary to the Ministry of Health calculated that in the whole country 7,000 were waiting for chronic sick beds. The problem was primarily one of providing adequate accommodation, but it was also necessary to gain a new outlook on the aged sick. They should be stopped from going to hospitals if that was possible, as frequently those in chronic sick wards were not in need of hospital treatment. It was necessary to set out to cure old people who were in hospital and to try to get them out to lead an ordinary existence. In their own homes old people had the attention of their general practitioner and could consult specialists under the National Health scheme. Occupational therapy should be made available to patients in their own homes, and adequate nursing. Voluntary organizations could provide old people with meals in their homes and help them in other ways. Domiciliary treatment on those lines was cheap and would allow more effective use of hospital beds. The expense would be something like £3 a week against between £8 and £15 a week in the chronic sick wards of hospitals. For old people who could not stay in their own homes hostels should be provided either of the ordinary welfare type or of the kind which catered for those who alternated between sickness and good health. Big local authorities were providing these hostels, but more were needed. Hospital treatment in the first place should be on a short-term basis. Every hospital ought to be encouraged by the Ministry of Health to set up a geriatric department. He quoted statements by Lord Amulree, under whose supervision the first geriatric unit in a teaching hospital was set up at St. Pancras, that only about 13% of the cases admitted to the unit were regarded as irremediable.

HALF-WAY HOUSES

Mr. A. BLENKINSOP agreed that it was important to prevent old people from becoming chronic cases. The first care of the Government must be to improve the domiciliary services, and to assist the hospitals in providing accommodation for those who could be discharged. It was essential to bring together the voluntary and statutory agencies working in this field, and there had been a great response to the circular issued by the Ministry of Health a year ago to local authorities urging them to co-ordinate all bodies engaged in welfare work for old people. There were now 42 county old people's welfare committees, generally including both voluntary and statutory bodies. He was anxious to encourage the setting up of committees where this had not been done and that would assist the hospitals as well. Many local authorities had set up residential hostels under the provisions of the National Assistance Act. There were about 350 of these in England and Wales and another 400 were in preparation. These hostels provided accommodation for about 8,000 old people. They had been intended mainly for the healthy old, and where people fell sick the problem arose of whether they should be moved into some other type of

hospital or whether provision could be made to meet their needs where they were. There ought to be some experimental provision of intermediate accommodation for those who were partly sick and partly well. The main problem, however, still lay with the hospitals and was chiefly one of trying to make better use of existing accommodation. It was possible with a better turn-over of hospital beds to meet most of the problems of the waiting-list. The Ministry was doing what it could to encourage active work in the hospitals on geriatrics. Much more effective co-operation was required between the different authorities concerned and was more a matter of co-operation by those on the spot than of setting up committees at regional or national level. He was anxious to encourage provision of hostels for patients who were not permanent bed cases but required regular nursing and medical care and could ultimately be discharged. Funds had been provided by the King Edward VII Hospital Fund for such hostels and he hoped it would not be long before there were many more of these places.

Mr. J. ENOCH POWELL said the cost of the social services was largely governed by the rate of turnover, and any measure which promoted a more rapid turnover and thus a reduction in overheads would be the truest economy which could be carried out.

The debate then closed.

Accommodation for Infirm.—In Scotland 5,936 beds are available in local authority establishments for the care of aged and infirm persons, and 3,000 additional beds in voluntary and private establishments. Local authorities estimate future needs as 5,600 additional beds.

Sulphur.—Strains of bacteria most effective in producing sulphur have been isolated and cultures are kept at the Chemical Research Laboratory. Further quantities can be bred from these.

Medico-Legal

CHEMISTS' SHOP NOT A "FACTORY"

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

The Court of Appeal recently dismissed an appeal[1] by a Mr. H. Joyce, who was employed as a porter at the Leytonstone branch of Boots Cash Chemists (Southern) Ltd., from a judgment of Mr Justice Slade in the company's favour. Mr. Joyce was injured while carrying a box of medicines upstairs, when he tripped at the top of the stairs because the linoleum on the top stair was raised from one-eighth to three-sixteenths of an inch above stair level. He had been employed at the branch for 21 months before his accident.

It had been contended before Mr. Justice Slade that the shop was a "factory" within the meaning of the Factories Act, 1937, and that the company was in breach of the provisions of that Act by allowing the linoleum on the top stair to be in such a condition. Alternatively, it was contended that the company was negligent at common law. Mr. Justice Slade held that the shop was not a "factory" within the meaning of the Act, and that the company had not been negligent at common law. He refused to say that the top of the stairs was dangerous because the linoleum had not been set back 4 ft.

The Lord Chief Justice, Lord Goddard, in his judgment dismissing the appeal, said that, in the five and a half years that the linoleum had been in place, hundreds of people, including Mr. Joyce himself, had passed over it without accident or complaint, and Mr. Joyce had, like hundreds of people before him, tripped. But the fact that an accident might happen at that place did not necessarily mean that the place was dangerous, and he agreed with Mr. Justice Slade's conclusion that it was not.

Lord Justice Singleton and Lord Justice Denning agreed that the appeal should be dismissed.

[1] *The Times*, March 3.

Universities and Colleges

UNIVERSITY OF OXFORD

Dr. J. M. Walker has been elected a member of the General Board of the Faculties by the Faculties of Medicine, Physical Sciences, Biological Sciences, Anthropology and Geography, and Agriculture and Forestry.

Sir Hugh Cairns and Professor L. J. Witts have been elected official clinical members and Dr. G. S. Dawes, Dr. D. S. Parsons, Dr. H. M. Sinclair, Mr. J. A. Stallworthy, and Dr. A. G. M. Weddell ordinary members of the Board of the Faculty of Medicine.

Professor R. A. Peters, F.R.S., has been elected an official member of the Board of the Faculty of Physical Sciences.

Professor W. E. Le Gros Clark, F.R.S., and Professor R. A. Peters, F.R.S., have been elected official members and Dr. H. M. Sinclair an ordinary member of the Board of the Faculty of Biological Sciences.

All the above appointments are for two years from the first day of Michaelmas Term, 1951.

On May 30 Sir John Conybeare was elected a member of the Board of the Faculty of Medicine by the General Board electorate for two years from October 1.

UNIVERSITY OF CAMBRIDGE

Dr. W. A. Fell has been appointed an Associate Lecturer in Physical Medicine in the Faculty of Medicine from April 1 with tenure for three years.

In Congregation on May 26 the following medical degrees were conferred:

M.D.—W. W. Brigden, M. A. Epstein, G. A. Newsholme, F. McL. McGown, A. N. Exton-Smith, J. L. Fluker, V. R. Pickles.

M.B., B.CHIR.—*A. D. Moore, S. D. Bradley.

*By proxy.

UNIVERSITY OF SHEFFIELD

Applications are invited for the J. G. Graves Medical Research Fellowship. The Fellow appointed will be required to undertake full-time medical research in one of the departments of the University of Sheffield (clinical or other) or in a teaching hospital associated with the University. The value of the Fellowship is £1,300 per annum, and the normal period of tenure is three years with the possibility of extension for not more than a further two years. Applications (three copies) indicating the line of research proposed by the applicant, and including the names and addresses of three referees and, if desired, copies of not more than three testimonials, should reach the Registrar, University of Sheffield, Sheffield, 10, by July 28.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

At a quarterly meeting of the College held on May 1, with Sir David K. Henderson in the chair, the following were elected Fellows of the College: A. P. Agnew, T. Semple, R. W. B. Ellis.

The following were elected Members of the College: A. Kahan, K. C. Kandhari, K. Aaron, A. Mohammad, D. R. Barry, O. T. Samani, J. D. Robertson, P. W. Wishart, K. G. Lowe, A. K. Siddiqui, Muriel M. McLean, C. M. B. Field, C. D. T. MacLean, B. C. Sinclair-Smith, W. J. Bell, A. S. Douglas, J. Hingston, J. F. C. Waterston, K. B. F. Witcombe, D. Banerjee, N. P. Bector, G. Selby, H. J. Stott, H. W. Macintyre, A. S. Thambiah, M. M. Pradhan, M. F. Oliver.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH

At a meeting of the College held on May 17, with Mr. W. Quarry Wood, President, in the chair, the following candidates, who had passed the requisite examinations, were admitted Fellows: H. A. Beagley, A. El Masry, W. T. Gibbs, R. R. Gilfillan, P. D. Goatcher, J. McL. D. Hay, T. A. H. Hurrell, R. M. Jackson, W. H. McGillivray, I. N. Maciver, M. Mukherji, T. J. Noonan, G. Singh, D. B. Skewes, R. G. Townsend, L. W. van Blerck,

SOCIETY OF APOTHECARIES OF LONDON

The sixth Joseph Strickland Goodall Memorial Lecture will be delivered by Dr. T. Jenner Hoskin at Apothecaries' Hall, Black Friars Lane, Queen Victoria Street, London, E.C., on Tuesday, June 26, at 5 p.m. His subject is "Thyroid in Heart Disease." Members of the medical profession and senior students are invited to attend the lecture.

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles for the week ending May 26 (No. 21).

Figures of notified *cases* are for: (*a*) England and Wales (London included). (*b*) London (administrative county). (*c*) Scotland. (*d*) Northern Ireland. (*e*) Eire. Figures of *births and deaths* and of *deaths* recorded under each disease are for: (*a*) The 126 great towns in England and Wales (London included). (*b*) London (administrative county). (*c*) The 16 principal towns in Scotland. (*d*) The 10 principal towns in Northern Ireland. (*e*) The 13 principal towns in Eire. A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, Northern Ireland, and Eire, the Ministry of Health and Local Government of Northern Ireland, and the Department of Health of Eire.

Disease	1951 Week Ending May 26					1950 Corresponding Week					1942–50 England & Wales Corresponding Week		
	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	Highest	Median	Lowest
Diphtheria	43	3	13	2	2	60	3	19	2	6	690	371	60
Deaths	—	—	—	—	—	—	—	—	—	—			
Dysentery	689	153	129	1	1	457	15	111	2	2	457	122	47
Deaths		—		—					—				
Encephalitis, acute	2	—	—	—		4	—	—	—		5	2	—
Deaths		—			—		—			—			
Erysipelas			11	2	8			24	3	3			
Food-poisoning	96	13		2		79	13		—				
Infective enteritis or diarrhoea under 2 years				17	18					24			
Deaths	14		1	—	1	17		2	1	2			
Measles*	19,189	748	424	263	263	9,354	463	725	178	224	13,468	9,354	2,662
Deaths		—	1	—	—			1	—	—			
Meningococcal infection	41	2	18	—	1	40	2	19	1	1	145	57	39
Deaths		1	—				—	1					
Ophthalmia neonatorum	28	—	14	—		50	3	4	—		92	71	50
Pneumonia, influenzal	613	34	5	7	1	489	20	7	6	—	861	557	485
Deaths (from influenza)†	11	3	1	—	1	17	2	1	—	—			
Pneumonia, primary			183					166					
Deaths	167	29		9	10	167	22		6	9			
Poliomyelitis, acute:													
Paralytic	22	1	4	—	2	50	5	7	5	5	50	9	4
Non-paralytic	8	2											
Deaths§	1	—			—	3	—			—			
Puerperal fever			5				—	7					
Puerperal pyrexia‖	99	11	6	1	2	82	8	4	2		165	135	82
Scarlet fever	933	66	164	22	62	1,295	104	167	71	84	2,001	1,233	982
Deaths		—	—	—	—			—	—	—			
Smallpox	—	—	—	—		—	—	—	—				
Deaths				—					—				
(1) Tuberculosis, respiratory			207	51				179	45				
(2) Tuberculosis, non-respiratory			41	5				36	5				
(1) Deaths	127	11	21	2	8	164	22	38	1	18			
(2) Deaths		2	5	—	6		2	5	—	3			
Typhoid fever	5	—	1	3	—	6	—	3	—	4			
Deaths¶	1	—	—	—		—	—	—	—		14	11	7
Paratyphoid fever	15	1	1 (B)	—		5	—	—	—	1 (B)			
Whooping-cough	3,002	174	326	71	59	2,966	172	372	45	79	3,085	2,266	855
Deaths	4	—	—	—	—	5	—	1	—	—			
Deaths (0–1 year)	270	30	26	9	20	228	27	26	10	12	416	313	228
Deaths (excluding stillbirths)	4,784	704	533	115	175	4,558	698	587	98	177	4,635	4,390	3,859
Annual death rate (per 1,000 persons living)			10·8					11·8					•
Live births	8,059	1,254	944	244	513	7,363	1,191	955	234	457	10,173	7,949	5,826
Annual rate per 1,000 persons living			19·1					19·2					
Stillbirths	211	21	23			178	14	27			261	221	178
Rate per 1,000 total births (including stillborn)			24					27					

* Measles not notifiable in Scotland and returns are approximate. † Includes primary form for England and Wales, London, and N. Ireland. § The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, and London (administrative county), are combined. ‖ Includes puerperal fever for England and Wales and for Eire. ¶ Deaths from paratyphoid fever are combined with those from typhoid fever.

Vital Statistics

Deaths from Lightning

During the last 30 years an average of 10 deaths a year from lightning has been recorded in England and Wales, the total number in that period being 305. This cause of death is rare, the deaths being about 1 in 50,000 of total deaths from all causes. In 1949 motor vehicles killed over 12 times as many people as were killed by lightning in the period of 30 years. The only year since 1920 when no death from lightning was recorded was 1937, and the year when the largest number was recorded was 1939 with 24 deaths. Table I shows the numbers of years in which various numbers of deaths from lightning were registered.

TABLE I.—*Numbers of Deaths from Lightning a Year in England and Wales, 1920–49*

No. of Deaths in a Year	No. of Years	No. of Deaths in a Year	No. of Years
0	1	11	4
3	2	12	2
4	1	14	2
5	2	15	3
7	4	17	1
8	2	19	1
10	4	24	1

Men are much more liable to be killed by lightning, the ratio of male deaths to female being 8 to 1. The age distribution of the deaths is shown in Table II.

TABLE II.—*Age Distribution of Deaths from Lightning, 1920–49, England and Wales*

Ages	Age Distribution	
	M	F
Under 1	—	—
1–	1	—
5–	7	2
10–	15	3
15–	40	7
20–	22	7
25–	46	7
35–	51	3
45–	31	4
55–	28	1
65–	23	—
75+	6	1
Total	270	35

As is to be expected, there are many more deaths from lightning in the summer than in the winter. The distribution by months is shown in Table III for the period 1921 (when the figures were first available) to 1949.

TABLE III.—*Monthly Distribution of Deaths from Lightning in 1921–49, England and Wales*

Month	Number
January	1
February	1
March	5
April	7
May	28
June	54
July	91
August	60
September	32
October	9
November	3
December	2
Total	293

Industrial Accidents and Diseases

The number of workpeople (other than seamen) in the United Kingdom whose deaths from accidents in the course of their employment were reported in April was 126, compared with 128 in the previous month and 114 (revised figure) in April, 1950 (*Ministry of Labour Gazette*, May, 1951).

There were 8 cases of lead-poisoning, 5 of anthrax, 10 of epitheliomatous ulceration, and 10 of chrome ulceration. There was one death from anthrax of a person handling and sorting hides and skins.

In 1950 provisional figures show that the number of persons killed at mines (mines of coal, stratified ironstone, shale, and fireclay) was 493, compared with 460 in 1949. The total number of fatalities underground was 447, an increase of 36 compared with the figure of 411 in 1949. Of these 447 deaths, 93 occurred in September, 1950, in the disasters at the Creswell and Knockshinnoch Castle collieries.

Poliomyelitis

Poliomyelitis notifications in the week ending June 2 were as follows (figures for the previous week in parentheses): paralytic, 16 (22); non-paralytic, 12 (8); total, 28 (30).

Notifications to date in the current year are compared with the uncorrected notifications in the previous four years in the Table below. Distinction is made in each year between weeks 1–13 and weeks 14–22. Notifications in the first of these periods may be regarded largely as a consequence of the previous year's experience. This is not likely to apply in any material degree to cases in the second period, and it is the numbers of these which are most likely to give an indication of the probable experience in the subsequent poliomyelitis season, if in fact they afford any such indication at all; of this there is no proof.

Uncorrected Notifications of Acute Poliomyelitis, England and Wales

Year	Total in Year	Weeks 1–13		Weeks 14–22		Remarks
		Actual	Percentage of Total for Year	Actual	Percentage of Total for Year	
1947	9,335	125	1·3	102	1·1	Epidemic year
1948	2,239	418	18·7	167	7·5	Post-epidemic year
1949	6,960	248	3·6	116	1·7	Epidemic year
1950	8,766	512	5·8	249	2·8	Post-epidemic and epidemic year
1951	?	339	?	200	?	

Infectious Diseases

An increase in the number of notifications was recorded in England and Wales during the week ending May 26 for measles 808, whooping-cough 446, acute pneumonia 130, and dysentery 28, while the only fall of any size was scarlet fever 58.

The largest rises in the number of notifications of measles were in Northumberland 147, Durham 135, Warwickshire 124, Derbyshire 121, Lancashire 115, and the largest decreases were Middlesex 88 and Yorkshire West Riding 81. The largest rises in the number of notifications of whooping-cough were in Yorkshire West Riding 70, London 52, and Warwickshire 33. The notifications of diphtheria were 12 more than in the preceding week; the largest fluctuations in the local returns were increases of 4 in Staffordshire and 3 in Cheshire. The largest centres of diphtheria were Staffordshire, Coseley U.D. 5; Cheshire, Birkenhead C.B. 5; Devonshire, Plymouth C.B. 5. Only small changes occurred in the local returns of scarlet fever; the decrease in incidence was mainly contributed by the southern section of the country. A small rise in the incidence of acute pneumonia occurred throughout the country.

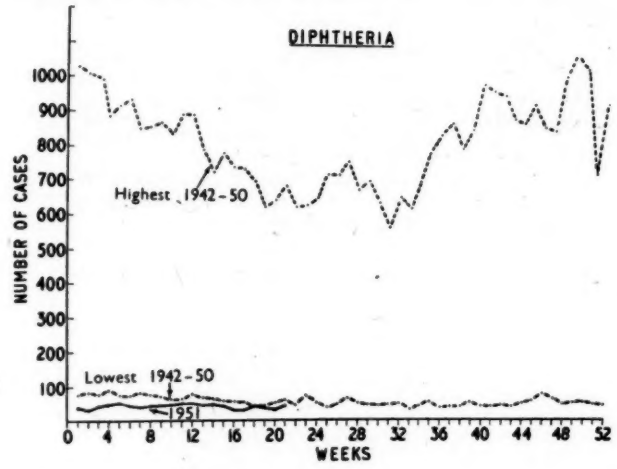
Six cases of paratyphoid fever were notified from an outbreak in Pembrokeshire, Haverfordwest R.D. The notifications of acute poliomyelitis were 6 more than in the preceding week, and the returns were the largest for 16 weeks. A rise of 10 in the number of notifications was recorded in the combined south-east and south-west counties. Eight counties had more than one notification of acute poliomyelitis; the administration areas with more than one case

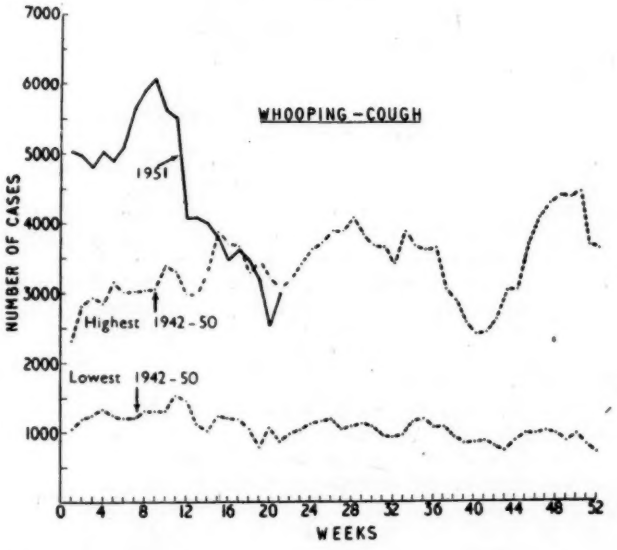
were Warwickshire, Coventry C.B. 3; Kent, Gravesend M.B. 2; Southampton, Gosport M.B. 2; Dorset, Poole M.B. 2; London, Kensington 2.

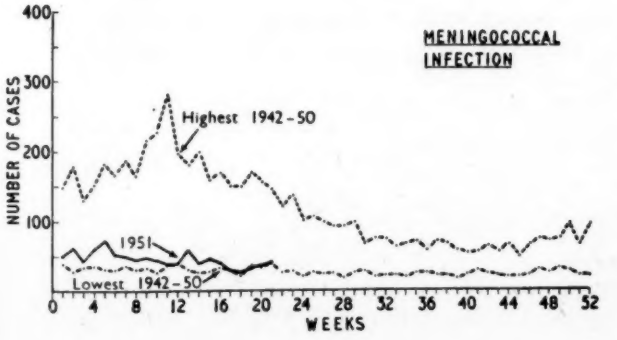
The largest returns for dysentery were London 153 (Islington 44, Lewisham 32), Lancashire 122 (Blackburn C.B. 31, Manchester C.B. 25), Middlesex 65 (Enfield U.D. 14, Ealing M.B. 13), Yorkshire West Riding 45.

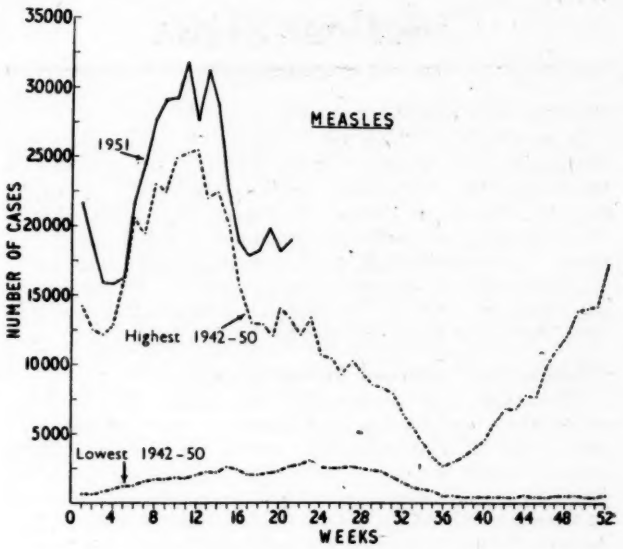
Graphs of Infectious Diseases

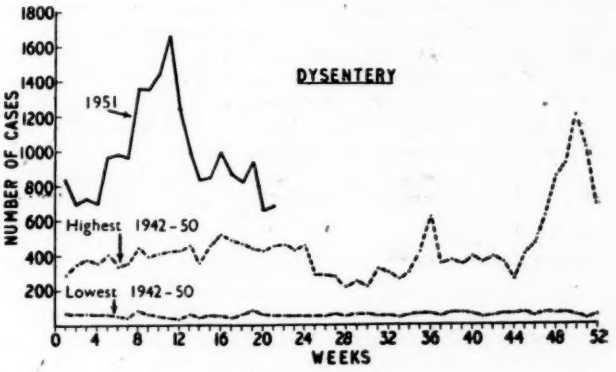
The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported during the nine years 1942–50 are shown thus -------, the figures for 1951 thus ————. Except for the curves showing notifications in 1951, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.

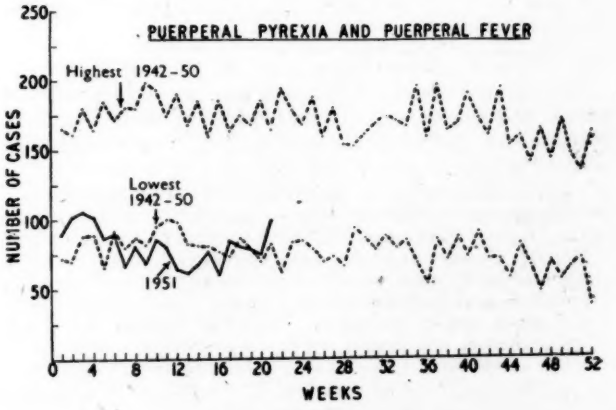












Week Ending June 2

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,043, whooping-cough 3,218, diphtheria 47, measles 15,630, acute pneumonia 500, acute poliomyelitis 28, dysentery 753, paratyphoid fever 4, and typhoid fever 20. Deaths from influenza in the great towns numbered 8.

Casualties Union's annual open competition in diagnosis and first-aid will be decided in London on Sunday, October 7. The competition will be realistic throughout, and copies of the rules can be obtained by sending a stamped addressed envelope to the hon. secretary, 29, Whyteleafe Hill, Whyteleafe, Surrey. The last date for ordinary entries is August 31, although entries will be accepted until September 7 if accompanied by a special late fee.

Medical News

Birthday Honours

In the Birthday Honours a knighthood is conferred on Professor E. K. Rideal, F.R.S., professor of chemistry in the University of London and president of the Chemical Society; Professor Lillian M. Penson, vice-chancellor of the University of London, is appointed a D.B.E.; and Professor A. Bradford Hill, professor of medical statistics in the University of London, honorary director of the Statistical Research Unit of the Medical Research Council, and consultant in medical statistics to the R.A.F., a C.B.E.

Orphans and Widows of Medical Men

The annual general meeting of the Society for the Relief of Widows and Orphans of Medical Men was held on June 6 at 11, Chandos Street, W.1. In the unavoidable absence of the president, Sir Robert Young, the chair was taken by Mr. C. Hope Gunning. The report for 1950 was presented by the secretary; during the year 39 necessitous widows of medical men had received grants from the Society, a total of £5,028 having been distributed among them. Sir Ernest Rock Carling then presented the treasurer's statement. The meeting approved amendments to the by-laws aimed at giving the directors of the Society greater discretion in assisting widows, and at simplifying the procedure for applying for assistance; these amendments will again be considered at a special general meeting in July. The Society has now a membership of 240. Inquiries about the Society should be made to the secretary at the above address.

The Medical Directory

The accuracy of the *Medical Directory* depends on the return of the annual schedule, which has recently been posted to members of the medical profession. Should the schedule have been mislaid, a duplicate can be obtained from the Editor, *The Medical Directory*, 104, Gloucester Place, London, W.1. The full names of the doctor should be sent for identification.

Recognition for Bravery

The *London Gazette* has announced the appointment as M.B.E. (Civil Division) of Dr. PETER STANFORD LONDON, Birmingham Accident Hospital. The citation reads as follows:

"In the course of transporting a 35-ton 'Comet' tank through Birmingham it became necessary to unload the tank from the transporter in order that both vehicles could ascend a sharp incline in the centre of the city. When the tank was being remounted on to the trailer it heeled over and fell to the ground, trapping a man between the tank tracks and a parapet wall. Dr. LONDON was in charge of the mobile surgical unit which was summoned, and on his arrival he immediately went to the trapped man and commenced anti-shock treatment. In order to release the man, hawsers were fixed to the tank, which was then slowly raised from the wall on which it was resting. To prevent further injury to the man Dr. LONDON jumped into the cavity between the wall and the still-moving tank, so that he could support him. The doctor was fully aware of the danger that the tank might fall back on him during the lifting operations, but without regard for his own safety he remained with the injured man until the latter had been released and removed to hospital."

Guy's Hospital Restoration

Mr. Hilary Marquand announced on June 8, at a dinner in London attended by members of the governing body of Guy's Hospital and the medical staff, that the Ministry has sanctioned part of the plan to rebuild the hospital. The hospital is the first of its kind to be given permission to rebuild on so large a scale; it is estimated that £1m. will be needed for the project, and about half the cost will be covered by funds built up from donations from Lord Nuffield. Air-raid damage reduced Guy's to a 300-bed hospital during the war; there are now 575 beds, and the ultimate aim is to have 800. The present plan will mean the addition of one block in which it is hoped to have 350 beds. The complete rebuilding of the hospital as planned will be spread over about 50 years, and the plan just passed will probably take five years to complete.

International Council of Ophthalmology

At a meeting of the council in Paris on May 5 the following appointments were confirmed: president, Sir Stewart Duke-Elder; vice-president, Conrad Berens; secretary, Edward Hartman (2, Avenue Ingres, Paris XVI^{e}); treasurer, Marc Amsler. At this meeting it was decided that the XVII International Congress of Ophthalmology would be held in New York in the autumn of 1954 under the presidency of Bernard Samuels.

COMING EVENTS

Festival Scientific Meetings

There is still accommodation available for the following meetings:

Date and Time	*Subject*
Tuesday, June 19, 10 a.m. ..	The Decline of Infant Mortality
Friday, June 22, 2.15 p.m. ..	Orthopaedics
Tuesday, June 26, 10 a.m. ..	The Diagnosis and Management of Early Mental Disorders
Tuesday, June 26, 4.30 p.m. ..	Tropical Medicine
Wednesday, June 27, 10 a.m	Reactions in General Practice to Scientific Advances
Wednesday, June 27, 4.30 p.m.	Epidemiology
Monday, July 9, 4 p.m. ..	Odontology

The morning session on June 27 is designed particularly to interest general practitioners. Members wishing to obtain tickets for any of the above meetings are advised to apply as early as possible to the joint secretary of symposia, B.M.A. House, Tavistock Square, London, W.C.1. All other symposia are full (for programme see *Journal*, June 2, p. 1277).

Postgraduate Refresher Course

A medical postgraduate refresher course is being arranged by the Maternity and Child Welfare Group of the Society of Medical Officers of Health on June 30 and July 1. The first day's programme, on the theme of "Preparation for Motherhood," will be arranged by Professor J. A. Nixon, at University College Hospital, London, and the second, dealing with health education in maternity and child-welfare clinics, by the Central Council for Health Education (place of meeting not yet decided). Application forms may be obtained from the Society of Medical Officers of Health, Tavistock House South, Tavistock Square, London, W.C.1, and should be returned with a registration fee of 10s. 6d. to Dr. K. Hart, 26, Langside Crescent, Southgate, London, N.14.,

Forensic Pathologists

The second meeting of the British Association of Forensic Pathologists will be held in Edinburgh on June 16 from 9 a.m. in the Department of Forensic Medicine of the University. Further details of the association may be obtained from the Secretary, Dr. F. E. Camps, 79, Harley Street, London, W.1.

International Research Centre for Chemical Microbiology

The centre will be formally opened in Rome on June 25. Directed by Professor E. B. Chain, it is attached to the Istituto Superiore di Sanità, the chief centre for medical research and drug control of the Italian Government, under the direction of Professor Domenico Marotta. A symposium on "Bacterial Growth and its Inhibition" will be held on June 25–30, and will group some 20 scientists currently engaged in important research in the field of antibiotics. The symposium is jointly sponsored by the Istituto Superiore di Sanità, the Council for the Co-ordination of International Congresses of Medical Sciences, and the World Health Organization, and the papers presented will be published by W.H.O.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Monday

EDINBURGH UNIVERSITY.—At Physiology Class Room, June 18, 5 p.m., *"The Social Science,"* by Dr. Douglas Guthrie.

LONDON UNIVERSITY.—At Westminster Medical School (Meyerstein Lecture Theatre), Horseferry Road, London, S.W., June 18, 5.30 p.m., *"Male Fertility,"* Special University Lecture in Medicine by Dr. Edmond J. Farris (Philadelphia).

Tuesday

●INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—June 19, 5 p.m., *"Cutaneous Manifestations of Visceral Malignancy,"* by Dr. L. Forman.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, London, W.C.—June 19, 3.45 p.m., *"A Critique of the Present Concepts of Synovial Reactivities, with Special Reference to the So-called Synoviomata,"* Arnott Demonstration by Dr. H. D. Ross. (See also June 22.)

SOUTH-WEST LONDON MEDICAL SOCIETY.—At Bolingbroke Hospital, Wandsworth Common, London, S.W., June 19, 8.30 p.m., *"The Origin, Past History, Present Position, and Future Prospects of the General Practitioner,"* Bolingbroke Lecture by Mr. V. Zachary Cope, M.S., F.R.C.S.

WEST END HOSPITAL FOR NERVOUS DISEASES, 40, Marylebone Lane, London, W.—June 19, 2.30 p.m., *"Spinal Compression,"* clinical demonstration in neurology by Mr. G. C. Knight.

Wednesday

●INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—June 20, 5 p.m., *"Medical Mycology—Systemic Infections,"* by Dr. R. W. Riddell.

Thursday

ROYAL SOCIETY, Burlington House, Piccadilly, London, W.—June 21, *"Reactions in Monolayers,"* Bakerian Lecture by Professor E. K. Rideal, F.R.S.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.—At 26, Portland Place, London, W., June 21, 7.30 p.m., annual general meeting, to be followed by an ordinary meeting. *"Filariasis in Fiji,"* film by Sir Philip Manson-Bahr; *"Two New Cultures of Mycobacterium Leprae Hominis (Strains Chaves and Emilia) Pathogenic for Macacus Rhesus and Man,"* demonstration by Dr. H. C. de Souza-Araujo.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, Hyde Park Corner, London, S.W.—June 21, 4.30 p.m., *"Neurology,"* lecture-demonstration by Dr. Denis Williams.

Friday

INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—June 22, 5.30 p.m., clinical demonstration by Dr. F. R. Bettley.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, London, W.C.—June 22, 3.45 p.m., *"A Critique of the Present Concepts of Synovial Reactivities, with Special Reference to the So-called Synoviomata,"* Arnott Demonstration by Dr. H. D. Ross. (See also June 19.)

Saturday

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.—June 23, 2.30 p.m., visit to St. Helier Hospital, Wrythe Lane, Carshalton, Surrey.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Alexander.—On June 2, 1951, to Dr. June Alexander (formerly Tyson), wife of Dr. J. Gordon Alexander, Ellerburn, Nunburnholme Avenue, North Ferriby, E. Yorks, a daughter.

MARRIAGES

Gibson—Stark.—On June 1, 1951, at Cliftonhill Parish Church, John Baird Gibson, M.B., Ch.B., D.A., Paisley, to Agnes Macfarlane Stark, M.B., Ch.B., M.R.C.O.G., Coatbridge.

Redmond-Henderson—Redmond.—On June 1, 1951, in London, Sidney Redmond-Henderson to Winifred Helen Redmond, M.R.C.S., L.R.C.P.

DEATHS

Douglas.—On June 3, 1951, at Longmore Hospital, Edinburgh, Andrew Richmond Douglas, M.B., Ch.B., aged 72.

Gray.—On June 5, 1951, in hospital, Leo Patrick Gray, M.B., Ch.B., husband of Elizabeth Gray (formerly Wheatley), M.B., Ch.B., D.P.H., of Woodford Green, Essex, formerly of 97, The Ridgeway, Chingford, London, E.

Harries-Jones.—On June 7, 1951, at the General Hospital, Northampton, Evan Harries Harries-Jones, M.D., of The Cottage, Church Brampton, aged 77.

Longstaff.—On June 7, 1951, in South Africa, Eadbert Ralph Collison Longstaff, M.R.C.S., L.R.C.P.

Pedersen.—On June 4, 1951, at 27, Macdowall Road, Edinburgh, Peder Nielsen Pedersen, M.B., F.R.C.S.Ed., aged 70.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

"Three Months' Colic"

Q.—*Our baby is inclined to be wakeful from the 6 p.m. feed till 8 p.m., and, as she is 3 months old, being wakeful leads to howling. I am confident there are no dietetic errors. Is it in any way harmful to put ¼ gr. (16 mg.) phenobarbitone in the 6 p.m. feed? We have found this most effective.*

A.—It sounds very much as if this is the so-called "three months' colic," which is very common in the first three months of life, usually getting better soon after the third month. The cause of this is by no means certain. Brennemann (*Practice of Pediatrics*, 1949: W. F. Prior Co., Inc., Hagerstown, Maryland) discusses it in detail, and thinks that it is due to colonic flatulence with temporary kinks in the intestine. It is also discussed in Spock's excellent little book *Baby and Child Care* (1947: American Pocket Book Series).

The colic appears characteristically between 6 p.m. and 10 p.m. It is difficult to relieve, though sucking at the breast does appear to help. I see no harm at all in giving phenobarbitone ¼ gr. if it is found to give relief, but it should be dropped off as soon as possible, so that the child does not get to need it in order to sleep. Wakefulness at this time may also be due to habit in a child who was in earlier weeks necessarily picked up a great deal in the evenings as a result of colic (Spock, B., *Pediatrics*, 1949, **4**, 89, and Illingworth, R. S., *British Medical Journal*, 1951, **1**, 722).

Trauma and Parkinsonism

Q.—*Is trauma recognized as an occasional factor in the production of parkinsonism?*

A.—References to proved cases of traumatic parkinsonism are extremely rare. On theoretical grounds it is clearly a possibility for very deep trauma to affect the basal ganglia, by either a penetrating wound or haemorrhage, but usually patients do not survive such disasters. I have personally seen two cases in which a very grave psychological disturbance without actual injury was responsible for the production of a parkinsonian disturbance within a matter of hours. In a paper by Kremer, Ritchie Russell, and Smyth (*J. Neurol. Neurosurg. Psychiat.*, 1947, **10**, 49) are described a number of cases of mid-brain disturbance with parkinsonian features, dysarthria, and cranial nerve palsies.

Abnormal Hand and Eye Dominance

Q.—*What symptoms would lead one to suspect abnormal hand and eye dominance in a child, and how is dominance effectively demonstrated?*

Is abnormal dominance likely to have an adverse effect on a child's behaviour or his progress at school, and what advice should be given to parents and teachers in these cases?

A.—In answering this question it is presumed that the term "abnormal dominance" is used by the questioner to describe left-handedness with left-eyedness, as well as uneven lateral dominance such as is demonstrated by a child who is left-handed but right-eyed or the reverse. Signs of this condition in an intelligent child may be backwardness in reading and writing, associated with the writing of letters in mirror-form and of words from right to left. Such signs, however, are no more than suggestive, and may indicate only a particular developmental stage, negativism or, in reading especially, some difficulty in auditory synthesis. Considerable research has been directed to the relationship

between educational retardation and both cross-lateral dominance and left-handedness, with inconclusive results. Both Monroe[1] and Schonell[2] found in cases of reading difficulty a higher incidence of crossed-laterals and left-handers than among controls, but their control groups proved to contain 41% and 40% respectively of children who were not both right-eyed and right-handed, findings which suggest caution in assuming that right-hand-plus-eye dominance is normal for the general population.

Testing for dominance is an expert job best carried out by an educational psychologist or by a psychiatrist who has given special attention to the problem. Rough tests would include observation of which hand is commonly preferred by a child for a wide range of activities, including writing, throwing, winding, stirring, cutting, and sorting. A useful test for eye dominance is to get the child to look through a hole in a card held about 15 in. (38 cm.) from his face at a small object, such as a sixpence, on the floor: he looks first with both eyes, then with each in turn while the other is covered, and without moving either head or card: the eye with which he can still see the object is the dominant one. The test should be repeated three times with different objects, but even then it is not infallible, though strongly indicative if the results are consistent.

Although the less usual dominances may to some extent impede educational progress, it seems probable that they do so largely by acting as the last straw when there exists already some personality stress in the child or teaching methods which discourage individuality. It is often inhibiting to be labelled an oddity.

Parents and teachers may be assured that there is nothing abnormal about the child who is not right-eyed and right-handed, and that the best way to help him is by making learning a desirable and enjoyable part of social adaptation. In addition, orientation difficulties may be diminished by the use of a pencil to guide a child's eyes from left to right in reading, and by attention being drawn to initial letters. Writing is helped by tracing in coloured pencils until a left-to-right habit is established, by the use of the "Writing Pattern Method" of Marion Richardson, which is familiar to most teachers and by children looked on as a pleasant game.

REFERENCES

1 Monroe, M. (1928). *Methods for Diagnosis and Treatment of Cases of Reading Disability*. Clark University Press, Worcester, Mass.
2 Schonell, F. J. (1942). *Backwardness in the Basic Subjects*. Oliver and Boyd, Edinburgh.

Stump Carcinoma

Q.—*Is stump carcinoma of the cervix more frequent in patients in whom ovarian tissue has been conserved at the time of the subtotal hysterectomy?*

A.—The writer does not know of any published work which allows a firm answer to this question. Moreover, considering the many issues involved, for example, the indication for the operation, and the large number of cases of subtotal hysterectomy with and without oophorectomy which would have to be followed for many years, it would probably be difficult to produce significant statistics.

The implication that ovarian function is important in the development of carcinoma of the cervix is rather refuted by the general experience that the growth is more common in post-menopausal than in pre-menopausal women. Moreover, J. McL. Morris and J. V. Meigs (*Surg. Gynec. Obstet.*, 1950, **90**, 135) record 75 cases in which the growth developed in women previously subjected to bilateral oophorectomy. Several of these are no doubt included in their 143 cases of stump carcinoma, but it is not clear how many. F. Saegesser (*Gynaecologia, Basel*, 1947, **123**, 89) goes so far as to express the opinion that removal of the ovaries at the time of subtotal hysterectomy *increases* the risk of the subsequent development of cervical carcinoma. The evidence does not yet permit a conclusion for or against this or other views, but it does indicate that it is by no means uncommon for cancer, and indeed other growths such as fibroids, to arise in a cervical stump after ablation of ovarian function.

Blood Changes during Pregnancy

Q.—*What is the normal range of E.S.R., red blood cell count, and haemoglobin level in pregnancy?*

A.—The limits of normality in respect of E.S.R., red cell counts, and haemoglobin levels in normal pregnancy are not well defined. However, most workers would probably accept the data of Bethel, Gardiner, and MacKinnon (*Ann. intern. Med.*, 1939, **13**, 91) as being approximately correct. They conclude that red cell counts of less than 3,500,000 per c.mm. and a haemoglobin content of less than 10 g. per 100 ml. indicate anaemia. They record the following data as *average* figures for the different months of pregnancy.

	4th	5th	6th	7th	8th	9th	month
R.B.C. ..	4.47	4.20	3.93	3.94	4.02	4.04	mill. per c.mm.
Hb	11.8	11.4	11.0	11.1	11.2	11.2	g. per 100 ml.

The published limits for the E.S.R. in normal pregnancy indicate a very wide range. A review of relevant literature is given by Nichols (*J. Lab. clin. Med.*, 1942, **27**, 1317).

Post-mortem Appearances in Byssinosis

Q.—*Could you tell me the post-mortem findings to be expected in a case of byssinosis?*

A.—Unlike most other industrial pulmonary diseases, byssinosis presents no distinguishing post-mortem findings. At least this is the generally accepted view at present. The findings are those of emphysema, usually with chronic bronchitis and often with those of congestive heart failure. Shaw, Dunn, and Sheehan reported necropsies on 10 cotton workers, five of whom were strippers and grinders, and four of the latter showed hypertrophy of the right ventricle which indicated the severity of the condition (*Report of the Departmental Committee on Dust in Card Rooms*. Home Office. 1932. H.M.S.O., London). They noted the following negative points: (1) By use of the polarizing microscope, no trace of cotton fibre was found in the lungs or bronchial lymphatic glands in any case. (2) No feature was detected by which the cases of chronic bronchitis and emphysema might be differentiated from other cases of the same condition that have been observed in other workers.

Cotton workers with byssinosis must have worked for long periods in card rooms, blow rooms, or cotton rooms. It is not a disease suffered by spinners or weavers. The occupational history is therefore important.

Polycythaemia and Transfusion

Q.—*I understand that the blood from patients suffering with polycythaemia vera should not be used for transfusion. What is the reason for this?*

A.—Blood from patients suffering from polycythaemia vera is used in some haematological centres for transfusion. Because of its raised red cell count, such blood offers a convenient means of introducing a high concentration of haemoglobin. On the other hand its increased viscosity and its tendency to clot make the collection difficult. A wide-bore needle, a large volume of anticoagulant, and thorough mixing of blood and anticoagulant solution help to overcome these difficulties.

Myeloid leukaemia may develop in patients suffering from polycythaemia vera. This blood should not be used for transfusion.

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology, Westcent, London*. ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.
Authors desiring REPRINTS should communicate with the Publishing Manager, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs.
ADVERTISEMENTS should be addressed to the Advertisement Manager, B.M.A. House, Tavistock Square, London, W.C.1 (hours 9 a.m. to 5 p.m.). TELEPHONE: EUSTON 2111. TELEGRAMS: *Britmedads, Westcent, London*.
MEMBERS' SUBSCRIPTIONS should be sent to the SECRETARY of the Association. TELEPHONE: EUSTON 2111. TELEGRAMS: *Medisecra, Westcent, London*.
B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.